

This chapter addresses the initial placement, adjustment, relocation, and replacement of utility facilities in all State highways. It also describes specific requirements associated with these permit codes:

Sect.			Sect.		
628	<b>UB</b>	Utilities in or on a Bridge	620	<b>UL</b>	Underground Longitudinal (Minor)
618	<b>UC</b>	Conventional Aerial	617.1	<b>UM</b>	Utility Maintenance
617.2	<b>UE</b>	Utility Maintenance (Expanded)	621	<b>UR</b>	State Required Relocation
619	<b>UF</b>	Freeway Aerial	622	<b>US</b>	Service Connections
623	<b>UJ</b>	Transverse Bore & Jack	624	<b>UT</b>	Open Cut Road
620	<b>UK</b>	Underground Longitudinal (Major)	629	<b>UX</b>	Trenching & Shoring

All Engineering reports or plans for the design and construction of a proposed project, submitted for permit are required to be signed and stamped by a Registered Engineer.

In accordance with CPUC requirements, utility plans are not required to be signed or stamped by a Registered Engineer. [\(Rev. 02/06\)](#)

## 601 INTRODUCTION

The most common utility facilities are:

- Water
- Sewer
- Electrical
- Telephone
- Cable Television
- Cellular Telephone
- Natural Gas
- Common-carrier petroleum pipelines

Services, products, and commodities, such as those mentioned above, that are provided as a service to the public are called public utilities. Public corporations and private companies may own and operate facilities for the transmission and distribution of utilities. Public corporations are owned by the local governing body, e.g., the Sacramento Municipal Utility District (SMUD) and are governed by State law. Privately owned companies providing service to the public, such as, Pacific Gas and Electric (PG&E) and Southern California Edison are regulated by the California Public Utilities Commission (CPUC). Also, privately owned companies that do not generally provide utility service to the public and are not regulated by the CPUC, may service the public under a franchise by the local governing body (e.g., city or county).

Before a privately owned utility company can offer its services to the public it must, in most cases, first obtain a Certificate of Public Convenience and Necessity (CPCN) from the CPUC. After the CPCN is granted, the utility company must file its tariffs (rates) with the CPUC. Upon

approval and under CPUC regulation, the utility company can sell its services to the public. Qualifying utility companies are issued a User Fee Number by the CPUC.

In some cases, only certain segments of a company's facilities may be public utilities, while other segments are used exclusively by the company. If there is any question regarding the status of a permit applicant or a specific facility segment as to a public utility, contact the appropriate Branch (Energy, Telecommunication, or Water Utilities) of the CPUC's Advisory and Compliance Division. They will verify the status of the company or facility.

The Streets and Highways Code (Section 117) allows utility owners to use public property--including State highway right-of-way (with approval from the Department)--for transmitting and distributing products and services. Procedures differ for approving utility placement within controlled and non-controlled access right-of-way (see Sections 302, 606, and 607). To protect public investment in the State highway system and promote the safety of highway users, Caltrans has developed minimum standards for the occupancy and use of the State highway right-of-way for utility facilities.

Procedures for determining and collecting permit fees for utility facility encroachments owned by utility companies differ from those encroachments owned by private companies or developers. Usually, utility companies providing utility facility service to the public are billed for application and inspection fees whereas other companies pay fees at the time of application. For example, cable television systems holding city or county franchises are eligible for the same encroachment privileges that are available to public utility corporations, but must pay fees at the time applications are submitted. Cable television companies are not regulated by the CPUC.

Cellular telephone companies are communication-type public utilities that are regulated by the California Public Utilities Commission (CPUC). They are entitled to the same considerations granted to all communication utility companies for use of State right-of-way.

A permit must be issued to the owner of the encroachment. A utility facility encroachment may be constructed or installed by someone other than the owner. Double-permitting is **not** regularly encouraged for utility facility encroachments placed by the utility owner's contractors. Usually, they are agents of the utility company. Inspection fees are charged directly to the utility company (permittee) and therefore a double permit is not necessary unless circumstances dictate otherwise.

The installer or contractor may be required to apply for and secure an encroachment permit (double permit) if prior contractor performance was poor. In this situation, the double permit provides Caltrans with direct control over the authorized work. Double permits, when required, are issued at a one-hour minimum fee, but inspection costs are billed directly to the utility owner.

#### **601.1      Utility Owner Prior Rights**

Utility encroachment activities involving utility work wherein the utility owner has prior rights (utility facility in place before highway right-of-way purchase), i.e., a Consent to Common Use Agreement (CCUA) or a Joint Use Agreement (JUA), shall take place as a fee exempt permit for

all the purposes for which the owner's original easement was acquired. These activities could include: modification, relocation, replacement, upgrade, and maintenance.

Utility owners with prior rights shall submit an encroachment permit application package that includes prior rights identified for verification (CCUA or JUA number if available). If a number is not available, the application should be reviewed by district Right of Way Engineering and Right of Way Utilities to ensure that the proposed work is authorized under a prior property right.

The District Right of Way Utilities Branch shall determine when the encroachment permit will be stamped "For Record Purposes Only." These types of encroachment permits shall contain the following clause:

"It is understood that the Owner's easement(s) within the area of common use within the highway or at a new location within the highway may be used for the purpose for which the original easement(s) was acquired subject to Permittee providing advance notification of planned work and adherence to traffic safety and highway integrity requirements as contained elsewhere in this permit."

When a contractor's double permit is required, it shall also be a fee exempt permit.

## **602 CONDITIONS OF OCCUPANCY IN RIGHT-OF-WAY**

All utility encroachments in the State highway right-of-way shall be designed, installed, and maintained so that traffic disruption and other hazards to highway users are minimized. The design shall be in compliance with Section 309 of the Highway Design Manual. Encroachments shall not be constructed or installed if they adversely affect the safety, design, construction, operation, maintenance, or stability of the highway or any proposed or existing highway appurtenance.

Damaged plants or landscaped areas shall be replaced or restored, and surface structures shall be consistent with aesthetic values of the highway and with engineering standards and economic feasibility. Access to utility facilities on conventional highways is permitted from the right-of-way or roadway.

Access to utility facilities located within the freeway and expressway right-of-way normally is permitted only from frontage roads, public roads and streets, trails, or auxiliary roads. In some situations, the installation of a locked gate by a utility company in a freeway fence is permitted only when approved by the Program Manager, Design and Local Programs (DLP). An exception to this policy pertains to sites within the right-of-way leased for wireless telecommunications facilities. The District Airspace Review Committee (DARC) rather than DLP approves gate installation under the air space lease agreement (Section 501.6F).

The Program Manager, DLP must approve utility support structures, manholes, or other appurtenances that are located in interchanges, median areas, or within any other controlled access area when access for servicing is not possible by the means described above. To ensure

safety, terms and conditions may be imposed on the utility company limiting access to such facilities from ramps or through traffic lanes.

#### **602.1      Temporary Steel Plate Bridging--With a Non-Skid Surface**

Highway encroachment work involving excavations shall be identified during the review process of the permit application package. To accommodate excavation work, steel plate bridging may be necessary. All permit conditions for use of steel plate bridging should be set forth in the special provisions of the permit.

Consideration of steel plate bridging in the review process should take into account the following factors:

1.      Traffic volume and composition.
2.      Duration and size of the proposed excavation.
3.      Weather conditions.

When it is determined in the review process that shoring will be a part of the permitted operation, the shoring shall conform to Section 516.10 of this Manual.

When backfilling operations of an excavation in the traveled way, whether transverse or longitudinal, cannot be properly completed within a work day, steel plate bridging with a non-skid surface and shoring may be required to preserve unobstructed traffic flow. In such cases, the following conditions shall apply:

1.      Steel plate bridging on freeways is not allowed.
2.      Steel plates used for bridging must extend a minimum of 12" beyond the edges of the trench.
3.      Steel plate bridging shall be installed to operate with minimum noise.
4.      The trench shall be adequately shored, as mentioned in Section 516.10, to support the bridging and traffic loads.
5.      Temporary paving with cold asphalt concrete shall be used to feather the edges of the plates, if plate installation by Method (2) described below, is used.
6.      Bridging shall be secured against displacement by using adjustable cleats, shims, or other devices.

As required by the district, steel plate bridging and shoring shall be installed using either Method (1) or (2):

**Method 1**      For speeds greater than 45 mph:

The pavement shall be cold planed to a depth equal to the thickness of the plate and to a width and length equal to the dimensions of the plate.

**Method 2**      For speeds less than 45 mph:

Approach plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of 2 dowels pre-drilled into the corners of the plate and drilled 2" into the pavement. Subsequent plates are butted to each other. Fine graded asphalt concrete shall be compacted to form ramps, maximum slope 8.5 % with a minimum 12" taper to cover all edges of the steel plates. When steel plates are removed, the dowel holes in the pavement shall be backfilled with either graded fines of asphalt concrete mix, concrete slurry or an equivalent slurry that is satisfactory to the Caltrans' representative.

The permittee is responsible for maintenance of the steel plates, shoring, and asphalt concrete ramps.

Unless specifically noted in the provisions of the permit, or approved by the State representative, use of steel plate bridging should not exceed 4 consecutive working days in any given week. Backfilling of excavations shall be covered with a minimum 3" temporary layer of cold asphalt concrete.

The following table shows the advisory minimal thickness of steel plate bridging required for a given trench width (A-36 grade steel, designed for HS20-44 truck loading per Caltrans Bridge Design Specifications Manual).

<u>Trench Width</u>	<u>Minimum Plate Thickness</u>
10"	1/2"
1'-11"	3/4"
2'-7"	7/8"
3'-5"	1"
5'-3"	1 1/4"

NOTE: For spans greater than 5'-3", a structural design shall be prepared by a California registered civil engineer.

All steel plates within the right-of-way whether used in or out of the traveled way shall be without deformation. Inspectors can determine the trueness of steel plates by using a straight edge and should reject any plate that is permanently deformed.

Steel plates used in the traveled portion of the highway shall have a surface that was manufactured with a nominal Coefficient Of Friction (COF) of 0.35 as determined by California Test Method 342 (See Appendix H). If a different test method is used, the permittee may utilize standard test plates with known coefficients of friction available from each Caltrans District Materials Engineer to correlate skid resistance results to California Test Method 342. Based on the test data, the permittee shall determine what amount of surface wear is acceptable, and independently ascertain when to remove, test, or resurface an individual plate.

Caltrans' Permit Inspectors should not enforce plate removal unless it is permanently deformed or delivered without the required surfacing. The utility owners and contractors are responsible for

maintaining plates and ensuring that they meet minimum specifications. They will also independently determine when to accept, test or reject a plate. However, an inspector should document in a diary all contacts with the utility owners and contractors.

A Rough Road sign (W33) with black lettering on an orange background may be used in advance of steel plate bridging. This sign is used along with any other required construction signing.

Surfacing requirements are not necessary for steel plates used in parking strips, on shoulders not used for turning movements, or on connecting driveways, etc., not open to the public.

### **603 INSTALLATION AND MAINTENANCE OF UTILITIES**

A permit must be issued to the owner of the encroaching facility. When more than one owner uses a common duct structure, e.g., several separate utilities lines in a common casing, each owner must obtain a separate permit for its facility. Double permitting is not normally required (Section 601).

Permits are required for a utility owner and for a developer installing facilities that will be owned, operated, and maintained by the utility owner. The permit for installation of the utility facility is issued to the developer, but only after the utility owner submits an application for operation and maintenance of the facility. The developer is responsible for coordinating submission of the utility owner's application, and the utility owner is not charged for the permit. The permit issued to the utility owner states, "operate and maintain utility facility 'X' installed under Caltrans Encroachment Permit No. \_\_\_\_ issued to 'XYZ Developers, Inc.'"

Utility companies are allowed to place underground electric transformer vaults with grated covers within the right-of-way. Placement is permissible only after every reasonable effort is made to use alternate locations. The following conditions are required for approval of this type of installation:

1. The utility company shall assume responsibility for the design, installation, and maintenance of its facilities' equipment. They shall also assume responsibility for any damages that may result from this installation.
2. The utility company shall indemnify and defend the Department against all actions resulting from the design, installation, or maintenance of its equipment or facilities.
3. When vaults are installed in pedestrian areas, the utility company shall be responsible to design, locate and construct them in a manner that will minimize any interference with pedestrian traffic.

When replacing existing above ground facilities (e.g., poles, etc.) as part of maintenance, they should be relocated as close as possible to the right-of-way line to allow expansion of the Clear Recovery Zone.

**603.1** **Minimum Depth of Cover Requirements** [Rev \(10/03\)](#)

New installations of utilities and utility facilities require a minimum depth of cover of 36", and utility service connections require a minimum depth of cover of 30" within State highway right-of-way.

Signalization conduits require a minimum depth of cover of 18" when placed behind the curbface.

Policies on "High and Low Risk facilities" are discussed in section 605.

**604 UTILITY RELOCATIONS FOR STATE HIGHWAY CONTRACTS**

When highway construction occurs either by a State contract or a Special Funded Project in lieu of a State contract (e.g., projects programmed in STIP or SHOPP) that requires relocation of an existing utility facility encroachment, arrangements for relocation are initiated by the State. All relocated installations shall be covered by an encroachment permit regardless of who finances or constructs the highway project. The utility relocation permit is fee exempt.

All permits for local agency projects constructed by encroachment permit without a cooperative agreement shall contain this clause:

"If existing public or private utilities conflict with the construction PROJECT, PERMITTEE will make necessary arrangements with the owners of such utilities for their protection, relocation, or removal. PERMITTEE shall inspect the protection, relocation, or removal of such facilities. Total costs of such protection, relocation, or removal which STATE or PERMITTEE must legally pay, will be borne by PERMITTEE. If any protection, relocation, or removal of utilities is required, including determination of liability for cost, such work shall be performed in accordance with STATE policy and procedure. PERMITTEE shall require any utility company performing relocation work in the STATE's right-of-way to obtain a State Encroachment Permit before the performance of said relocation work. Any relocated utilities shall be correctly located and identified on the as-built plans."

Encroachment permits for developer projects being constructed without a highway improvement agreement shall contain the following clause:

"If existing public or private utilities conflict with the construction PROJECT, PERMITTEE will make necessary arrangements with the owners of such utilities for their protection, relocation, or removal. PERMITTEE shall inspect the protection, relocation, or removal of such facilities. Total costs of such protection, relocation, or removal shall be borne by PERMITTEE in compliance with the terms of the Highway Encroachment Permits, Case Law, Public Utility Regulations, and Property Rights. PERMITTEE shall require any utility company performing relocation work in the STATE's right-of-way to obtain a State Encroachment Permit before the performance

of said relocation work. Any relocated utilities shall be correctly located and identified on the as-built plans.”

State highway projects constructed under cooperative or highway improvement agreements do not require the above clauses in the permit provisions because similar provisions must be included in the respective agreements.

## **605 HIGH AND LOW RISK UNDERGROUND FACILITIES**

The policies on high and low risk underground facilities are governed by the Caltrans’ publication titled, “Project Development Procedures Manual,” Appendix LL—Utilities. Any exceptions to these policies require approval from the Program Manager, Design and Local Programs (DLP).

### **High Risk Facilities**

Facilities transporting the following materials, whether encased or not, are considered to be High Risk facilities:

1. Petroleum products,
2. Oxygen,
3. Chlorine,
4. Toxic or flammable gases,
5. Natural gas in pipelines greater than 6 inches nominal pipe diameter, or pipelines with normal operating pressures greater than 60 p.s.i.g. ,
6. Underground electric supply lines, conductors or cables having a potential to ground of more than 300 volts, either directly buried or in duct or conduit, which do not have concentric grounded or other effectively grounded metal shields or sheaths.

### **Low Risk Facilities**

Facilities transporting the following materials are considered to be Low Risk facilities:

1. Natural gas in pipelines 6 inches or smaller (nominal pipe diameter) with normal operating pressures of 60 p.s.i.g. or less.
2. Underground electric supply lines, conductors or cables with a potential to ground of more than 300 volts, either directly buried or in duct or conduit, which do have concentric grounded or other effectively grounded metal shields or sheaths, and for which the utility owner furnished location information in conformance with the requirements of Article 17.7, "Location Information" of General Order No. 128 of the California Public Utility Commission, or electrical underground conductors with a potential to ground of 300 volts or less.

### **Exempt Facilities**



Facilities exempt from the requirements of this policy are listed as follows:

1. Natural gas service lines of 2 inches or less (nominal pipe diameter) and with normal operating pressures of 60 p.s.i.g. or less.
2. Underground electrical service conductors with a potential to ground of 300 volts or less.
3. Any electrical facility with a potential to ground of 50 volts or less.
4. State-owned electrical facilities operating at 300 volts or less potential to ground.

### **New Installations Under Encroachment Permit**

The new installation of High and Low Risk facilities within existing or ultimate State highway right-of-way must be not less than 42 inches below existing ground level. New installations in proposed projects must meet the following minimum clearances along the location of the utility facility:

1. 42" below finished grade or 18" below grading plane of a currently planned project, whichever is greater.
2. 12" below existing or future drainage structures, but not less than the requirement in number "1" above.
3. 30" below flow line of unlined ditches.
4. 24" horizontally from face of pile or side of excavation for a currently planned project.
5. 36" below concrete sidewalks, where future street widening in the sidewalk area is not contemplated. This minimum may be reduced at the discretion of the utility owner, with the permission of the Permit Engineer.

NOTE: All highway related facilities, such as signal and lighting conduits, that meet the definition of High and Low Risk facilities must meet these standards.

New installations within streets or frontage roads to be turned over to a local agency may be installed at lesser depths, as allowed by Public Utility Commission General Orders or normal procedures.

Existing high and low risk facilities may remain in place until replacement at the end of their useful lives providing they comply with requirements governed by Caltrans' publication titled, "Project Development Procedures Manual," Appendix LL, Section 3.

Applications for installation of high and low risk underground facilities shall include a plan by the owner showing location and construction details.

## **606 ENCROACHMENTS ON FREEWAYS AND EXPRESSWAYS**

This section describes requirements for transverse and longitudinal utility encroachments on freeways and expressways.

### **606.1 General Requirements for Encroachment Location (Rev 02/03)**

Departmental policy prohibits the placement of longitudinal encroachments within controlled access rights-of-way. Requests for placement of longitudinal encroachments are permitted only when approved through the departmental exception process, through Headquarters Design & Local Programs (DLP), when no other reasonable alternative is available, and it has been determined that there is available space.

When prior rights are stipulated regarding the location within controlled access rights-of-way, encroachment permits shall be stamped "For Record Purposes Only" or "Freeway Permit," when determined by substantiation that is provided by the utility owner (see Section 601.1).

Under specific conditions, when the Department is responsible for the transmission and distribution of reclaimed water for its sole use, local public agencies and public water companies may be allowed to place transmission lines for reclaimed water within access controlled rights-of-way. When there is a proposed shared use of the reclaimed water, upon approval through the exception process, the utility facility owner shall be responsible for all initial and relocation costs, liability, maintenance of and other required conditions as specified.

Issuance of permits shall conform to policy on the "Accommodation of Utilities Within Freeway Rights of Way" (AASHTO, 1989; see Appendix A).

### **606.2 Access Requirements**

If normal means of access to an encroachment inside State access control right-of-way is impossible, inordinately difficult, or unreasonably costly, a locked gate in the fence may be installed by a public or privately owned utility company at a suitable location upon approval by the Program Manager, DLP.

Planned emergency access from freeways and expressways for new or expanded development is prohibited. Emergency access shall be provided from local streets or conventional highways outside the access control limits of freeways and expressways. Existing emergency access granted previously is allowed to remain.

Utility support structures, manholes, or other at-surface appurtenances may be allowed in interchange or median areas only if placement outside access control is not possible and approved by DLP.

Access from through traffic lanes or ramps should not be permitted except as approved by the Program Manager, DLP. Terms and conditions may be imposed to ensure safety.

Fire, law enforcement, and other emergency agencies may breach access controls, if necessary, to respond to specific emergencies. However, they must restore the State right-of-way, at their expense, and must obtain an encroachment permit to do so. The Program Manager, DLP must approve or deny any exceptions to this policy after district review and recommendation.

### **606.3      Transverse Encroachments**

Public utility facilities shall be granted permission to cross State highways, as well as facilities that are not dedicated to public use but are used for the same purposes as public utility facilities. Table 6.1 indicates the restrictions that apply to transverse encroachments within **freeways and expressways**. **Privately owned water, power, or communication facilities that are used for private purposes are allowed transverse crossings only when property or easements are under the same ownership on both sides of the highway.**

### **606.4      Longitudinal Encroachments**

Placement of longitudinal utility encroachments within freeway and expressway right-of-way is prohibited under Department policy. However, should unusual circumstances warrant consideration of such placement, requests shall be reviewed under the exception process by the Program Manager, Design and Local Programs (DLP). DLP must approve any exceptions to Statewide policies and standards governing encroachments within the State highway right-of-way (See Sections 301, 302, and 303).

Longitudinal encroachments and encroachments requiring facility maintenance within access control lines should be avoided. New public utility facilities may be placed within the right-of-way of frontage roads or parallel roads outside the access control of the freeway and expressway right-of-way. Installations within access control lines are extreme cases and are considered only when alternative placement is not reasonably available, and are approved as exceptions by the Program Manager, DLP.

An existing facility in place at the time of freeway construction or reconstruction shall be removed or relocated unless any other location would be inordinately difficult or unreasonably costly. Approval is given by the Program Manager, DLP and (for federal-aid freeways) the FHWA. Remaining facilities shall be as close to the right-of-way line as possible and serviced from outside the access control lines.

The FHWA has delegated authority to Caltrans to approve **public** (utility companies regulated by the CPUC) utility longitudinal installations. FHWA's approval of Caltrans' Utility Accommodation Plan, "A Guide for Accommodating Utilities Within Freeway Right of Way" (AASHTO, Appendix A) gives Caltrans limited authority. The following longitudinal encroachments may require approval by FHWA and are processed through DLP:

1. Longitudinal encroachments within the median area of freeways.
2. Longitudinal installations of any **privately** owned (companies not under CPUC regulations) pipeline or other type of utility-like facility.

Utilities shall not be located in median areas. Any exceptions to this policy require full justification, and approval by the Program Manager, DLP. Transmission lines for reclaimed water in freeway rights-of-way are treated as a variance to policy, and must be approved by the Program Manager, DLP.

Freeway and expressway utility service connections for State facilities on freeways and expressways should have all disconnects, meters, or shut-offs outside access control lines. The utility is required to obtain a NUS (No fee Utility Service) permit for the connection.

#### **606.4A**      **Telecommunications** ([Rev 10/04](#))

The Department may accommodate longitudinal telecommunications encroachments within controlled access right-of-way. Telecommunications are defined as any facility used to transmit voice, data, and/or video signals that are not transmitted through the air, including conduits, and cabling.

Accommodation shall be in accordance with Federal and State laws and shall not adversely impact the safety of motorists, highway workers or the aesthetic quality of the highway.

Underground longitudinal telecommunications encroachments within controlled access right-of-way may be approved at the District level subject to all of the requirements shown in Table 6.0. Requests submitted for the replacement of telecommunications (regardless of capacity or upgrade issues) shall adhere to policy as a new submittal.

The Headquarters Division of Design may approve exceptions to mandatory design standards in accordance with Departmental policy on encroachment exceptions.

#### **606.4B**      **CPUC Mandate:** ([Rev 10/04](#)) **New telecommunication wiring within existing facilities**

In conjunction with the California Public Utility Commission (CPUC) imposed mandate, existing telecommunications franchises must now share their unused conduits with competitors.

The Department may allow new telecommunication franchises to place their "**cabling only**" (fiber optics or wire) into an existing facility that falls under the parameters of "prior rights" or an "exception to policy", belonging to another telecommunications franchise within controlled access right-of-way.

The requesting telecommunications franchise shall submit proof of concurrence from the owning telecommunications franchise by means of an agreement, letter or contract when submitting their encroachment permit application.

**Table 6.0** (Rev 10/04)

**Requirements for Longitudinal Telecommunication Encroachments  
on controlled access right-of-way**

- 1) All installations shall be **underground** and subject to Department policy on encroachment permits including all applicable local, state and federal laws and regulations.
- 2) The Department may consider accommodation under master agreements, airspace leases, Request For Proposals (RFP) or any other legally acceptable method.
- 3) Compensation as determined by Headquarters Division of Right of Way shall be paid by the applicant. In lieu of whole or part of compensation, the Department may request that: conduits, fibers, access points, cabinets, vaults and/or stations dedicated for public use be placed at certain locations. The current fee schedule can be found at: <http://www.dot.ca.gov/hq/row/rps/Fiber optic.htm>
- 4) Telecommunications shall be placed outside the Clear Recovery Zone (CRZ, see Highway Design Manual), while telecommunications related facilities such as access points, cabinets, vaults and/or stations shall be placed outside controlled access right-of-way limits.
- 5) Telecommunications may be allowed within existing conduits if such conduits are outside the CRZ, while telecommunications related facilities such as access points, cabinets, vaults, and/or stations shall be placed outside controlled access right-of-way limits.
- 6) Telecommunications shall be placed as far from the traveled way as feasible.
- 7) The minimum underground depth of cover of telecommunications shall be 42".
- 8) Telecommunications shall not be permitted in the median.
- 9) Telecommunications shall not be permitted in existing or planned traveled lanes.
- 10) Routine maintenance of telecommunications and telecommunications related facilities shall be conducted under individual encroachment permits and not allowed under "blanket permits".
- 11) The Department may request that applicants place adequate conduit space at the time of initial installation to provide access for all reasonably foreseeable users (including itself), for the fifteen year period after installation as determined by applicant and approved by Department.
- 12) District may also limit construction activities (the number of trenching, plowing or boring) to once every five years if any of the following conditions apply:
  - a) Longitudinal telecommunications installation is fully or partially proposed within the CRZ and an encroachment exception is granted.
  - b) Installation exceeds one mile in length.
  - c) District determines that the future installation of telecommunication facilities will be limited because of physical constraints, limited right of way width, safety or other relevant factors.
- 13) If construction activities are limited as provided in 12), applicants will be required to provide public notice informing interested parties of the limitations and providing them an opportunity to respond and/or participate in the project (joint build). The notice process shall be as follows:
  - a) Applicant publishes a notice in one newspaper of general circulation in the county/counties where the project is proposed. The notice must provide a public response period of no less than 30 days from the date of publication; and
  - b) Applicant must provide notice to all telecommunication companies (obtain list from California Public Utilities Commission - CPUC) including a response period of no less than 30 days from the day they are notified. A copy of this notice shall be attached to the encroachment permit application.

**Table 6.1**  
**Transverse Encroachments on Freeways and Expressways**

The following restrictions apply to transverse encroachments within controlled access rights of way:

1. The number of crossings shall be minimized.
2. Service connections generally are not allowed to cross.
3. When feasible, any multiple installation should cross in a single conduit or structure.
4. Crossings should be normal (90 degrees) to the highway alignment where practical. Districts may only allow skews up to 30 degrees from normal.
5. Clearances of overhead crossings shall conform to regulations of the California PUC.
6. New installations under an existing roadbed and median shall be made by boring and jacking, directional drilling or other methods approved by the district.
7. Underground encroachments in a depressed section should be avoided. When possible, they shall cross at street overcrossings (See bridge encroachment requirements Sections 608 and 609).
8. Sag pipes (inverted siphons) should be avoided whenever there is a possibility of sedimentation in the sag. Air vents and provisions for draining the sag shall be required when sag pipes are unavoidable.
9. Overhead pipeline crossings in a depressed section shall be made at street overcrossings or by a separate structure of suitable appearance. Except for pipelines in box girders, the pipeline shall be placed in a watertight sleeve. A common structure should be used for multiple pipes.
10. Tunneling under freeways and expressways is considered under the following conditions:
  - Studies establish that the soil structure is sufficiently stable.
  - Permanent tunnel portals usually shall be located outside the right-of-way line or the access control line (if those do not coincide). Consideration may be given to a location within the access control line provided that it will not adversely affect highway operation, it is beyond the toe of slope of embankments, and prior approval is given by DLP.
11. Open canals and ditches shall not be permitted unless no other alternative is available.
12. Underground facilities normally should be encased between right-of-way lines.
13. Supports for **overhead** lines crossing freeways:
  - Should be placed near the right of way line with a minimum lateral clearance of 30' from the edge of an ultimate through lane.
  - Shall be located outside the controlled access right-of-way. Any other placement must be approved by the Program Manager, DLP.
  - Should not be permitted in median areas except for temporary guard poles to support netting for overhead line installation.
  - Should not be permitted on cut or fill slopes.
  - Shall not impair sight distances.

Consideration should be given to underground facilities when spanning roadways is not feasible.
14. Traffic always must be protected, and barriers or protective devices are required as necessary.

**606.5 New Longitudinal Encroachments Only--Waiver of Rights**

The statutory right conferred by Section 703 of the Streets and Highways Code for **publicly** owned sewers, fire hydrants, and any street lighting structure whether publicly or privately owned is a waiveable right under the provisions of Civil Code Section 3513. A prior right is established when a publicly owned utility existed before the location became a freeway. In this case utility relocation will occur at State expense. The following provision should be included in all encroachment permits issued for new longitudinal encroachments of publicly owned sewers and fire hydrants, and street lighting structures whether publicly or privately owned in a freeway:

[Name of person or entity waiving right, with full knowledge of the provisions and his (their) rights thereunder, expressly waives all rights whatsoever under Section 703 of the Streets and Highway Code which provides that publicly owned sewers and fire hydrants and any street lighting structure whether publicly or privately owned in any freeway shall be relocated when necessary at the expense of the Department].

**607 ENCROACHMENTS ON CONVENTIONAL HIGHWAYS**

This section describes requirements for transverse and longitudinal encroachments on conventional highways.

**607.1 General Requirements**

Districts are delegated authority to issue permits for the placement and maintenance of utility facilities within the conventional highway right-of-way. Applications for encroachments by publicly or privately owned utility companies (regulated by the CPUC) dedicated for public use are reviewed and approved at the district level. The districts may also approve encroachments by privately-owned utility companies dedicated for public use and franchised by the local governing body. Privately-owned utility companies that use the utility for their sole purpose may be granted an encroachment permit for reasonable transverse crossing of conventional highways, but longitudinal encroachments are not approved. Requests by companies for placement of longitudinal encroachment utilities for their sole purpose that are not dedicated for public use and franchised by the local governing body are subject to approval by the Program Manager, DLP (see Section 302).

**607.2 Transverse Encroachments**

Table 6.2 lists the restrictions that apply to transverse encroachments on conventional highways. The Reclamation Board, in maintaining the integrity of the State's levee system, issues permits for construction of facilities within the levee prism. Caltrans and the Reclamation Board cooperatively agreed to authorize Reclamation Board construction methods provided that Caltrans' minimum depth requirements are met. Encroachment permits to install underground facilities where a State highway is on or crosses a levee must indicate approval and inspection by the Reclamation Board.

**Table 6.2**  
**Restrictions upon Transverse Encroachments on Conventional Highways**

The following restrictions apply to transverse encroachments within the right-of-way of any conventional highway:

1. The number of crossings shall be minimized.
2. Underground distribution facilities on each side of the highway should be considered to avoid numerous crossings by service connections.
3. Crossings should be normal (90 degrees) to the highway alignment where practical.
4. Clearances of overhead crossings shall conform to regulations of the California Public Utilities Commission.
5. An existing authorized encroachment that will not affect new highway construction may be left in place at the district's discretion, provided the district determines that it will not constitute a safety hazard or obstruction to construction.
6. New installations under an existing roadbed shall be made by boring and jacking, directional drilling or other methods approved by the district.
7. Sag pipes (inverted siphons) shall be avoided whenever sedimentation in the sag is a possibility. Air vents and provisions for draining the sag shall be required when sag pipes are unavoidable.
8. Tunneling under conventional highways shall conform to the requirements for freeways.
9. Bore pits or manholes at street intersections should be located behind the State highway curb line where possible.
10. Open canals and ditches shall not be permitted unless no other alternative is available.
11. Supports for overhead lines in conventional highway right-of-way must be as close to the right-of-way line as possible, with a desirable minimum clear recovery zone of 20', and never closer than 1.5' back of the curb face.
12. Traffic must always be protected, and barriers or protective devices are required as necessary.

### **607.3      Longitudinal Encroachments**

New publicly owned utility facilities and privately owned utility facilities that are regulated by the CPUC and dedicated to public use may be placed within the right-of-way of conventional highways when approved by the district. Generally, such encroachments shall be located as close as possible to the right-of-way line and outside slope limits or behind curbs. The minimum desirable setback from the clear zone of a conventional highway is 20'. In no case is a pole allowed closer than 1.5' behind a curb face or less than 2' from the edge of a slope catch point or a driveway, or within a drainage ditch. Requests for longitudinal encroachments by privately owned companies for their own use shall be denied by the district. However, if a longitudinal encroachment warrants addition consideration, review is required by the Program Manager, DLP (see Section 607.1).



When highways are widened, existing and new installations should adhere to setback limits or should be protected. Consideration should be given to allow utility owners to place such encroachments underground in shoulder or parking areas.

In urban areas, manholes should not be located where there is a break in grade between the pavement and gutter or in major traffic lanes of a cross street. In areas where snow removal equipment is used, consideration should be given to slightly depressing the manhole.

Any existing underground facility located under the roadbed of a new unconstructed highway is permitted to remain in place during its useful life provided its depth complies with current standards and does not require relocation (as determined by the district Right of Way Utility Coordinator and Project Development) resulting from highway construction. If the encroachment is a public utility facility, consideration shall be given to the likelihood and extent of future service connections that will require cutting the pavement. Rules governing new installations will determine whether existing facilities must be relocated, or may be replaced in the same location, after expiration of their useful life.

High risk pipelines conveying gas, oil or other flammable fluid are not permitted in the right-of-way unless they are dedicated to public use (for example, the pipeline carries products of more than one owner and is under CPUC jurisdiction). Companies having franchise rights from local agencies may place their facilities within the right-of-way with approval from the Program Manager, DLP.

Encroachment permits are required for utility companies to operate and maintain services to State-installed facilities. Conventional highway service connections are to be installed in compliance with a utility company's annual permit. A No fee Utility Service (NUS) permit must be obtained by the utility company if the service connection does not qualify under the annual permit.

Existing legally-placed service facilities may be permitted to remain in place if they do not interfere with highway construction or use.

Utility poles should be located as close to the right-of-way line as possible. However, an overhang onto private property should not be allowed unless the impacted property owner provides an easement.

Underground facilities on conventional highways should be located as close to the right-of-way line as possible. Permissible locations are shown in Table 6.3.

**Table 6.3**  
**Permissible Locations for Underground Longitudinal Encroachments on Conventional Highways**

<b>URBAN AREAS</b> (in order of preference)	1.	As close to the right-of-way line as possible.
	2.	Back of sidewalk.
	3.	Under sidewalk.
	4.	Under parking lane.
	5.	Under the outermost lane of a multi-lane highway.
<b>RURAL AREAS</b> (in order of preference)	1.	As close to right-of-way line as possible.
	2.	Under unimproved shoulder.
	3.	Under paved shoulder.
	4.	Under the outer most lane of a multi-lane highway.

#### **607.4     Relocation or Removal of Encroachment**

Encroachment permits issued to publicly or privately owned utilities contain a statement in the General Provisions that in the event future improvements to the highway necessitates the relocation or removal of such encroachment, the permittee will relocate or remove the same at its sole expense. District Right of Way Utilities initiates a Notice to Relocate.

### **608     ENCROACHMENTS ON STRUCTURES**

Proposed encroachments on existing bridges and other existing structures must be reviewed by the Office of Structures Maintenance. One copy of the encroachment permit and completed plans authorizing work on structures is sent to the Office of Structures Maintenance and to headquarters Structures Construction.

Requests to place planting and landscape service facilities on existing structures, including outside surfaces, must be approved by Office of Structures Maintenance.

When a utility conduit, pipeline, or encasement for a pipeline crosses a structure and has cathodic protection, that installation must be electrically isolated from the structure. Any cathodic protection anode bed or deep anode well shall not be placed near any structure or culvert.

Specific stray current and cathodic protection mitigation issues should be directed to headquarters Structures Design, Electrical, Mechanical, Water and Waste Water Branch.

#### **608.1     State Contract Plans**

Installation plans for each utility that encroaches on a new structure must be approved by Structures Design before an encroachment permit is issued. This review is coordinated through the district project engineer. After award of the contract, utility plans not reviewed previously by Structures Design should be sent to Structures Maintenance for review and approval. Installation

of utility facilities in new structures is coordinated by the permit engineer through the district project engineer and solely by the permit engineer for existing structures. Installation of all relocated utility facilities is coordinated by district Right of Way.

**608.2      Requirements for Installing Utilities on Bridges**

Utility facilities on bridges must meet both the standard utility requirements and the additional requirements shown in Table 6.4 and Table 6.5.

**Table 6.4**  
**Additional Requirements for Utility Facilities Located on Bridges**

Utility facilities located on bridges must comply with the standard requirements and the following additional requirements:

1. Location:
  - A. Permitted encroachments preferably shall be located between girders.
  - B. Encroachments should not be exposed to view, and shall not be permitted on the exterior of a bridge unless they are enclosed and appear as an integral part of the bridge.  
Structures Maintenance may approve exceptions for unusual circumstances.
  - C. On very wide structures having an expansion joint in the median, installation normally can occur between the two interior girders in the median.
2. Encroachment applications must include adequate plans of installation and pertinent details showing:
  - A. Bridge number
  - B. Location of encroachment on bridge
  - C. Method of attachment to bridge
  - D. Type of material transported
  - E. Weight per foot of facility including load, encasement, etc.
  - F. Maximum operating pressure
  - G. Maximum flow rate of high pressure water lines in the event of a full rupture
  - H. Wall thickness of pipe
3. Gas pipelines require additional information according to CPUC General Orders.
4. Pipelines carrying highly volatile fluids must show the location of the nearest automatic shut-off valves on each side of the structure. Shut-off valves are required to be within a reasonable distance of the structure.
5. Pipelines conveying water, sewage, and low volatile fluids shall include evidence of compliance with corrosion control requirements of the Federal Department of Transportation and the California PUC.
6. Electrical and communication conduits must indicate maximum voltage and description of carrier conduit. Additional information may be required by Structures (e.g. "Data for High Voltage Cables on Bridges" form see Appendix D).
7. Access to utility facilities on undercrossing structures or bridges over waterways is prohibited from the surface of the traveled way of the State highway. Manholes in the shoulder area or sidewalk area may be authorized. Access to utility facilities on overcrossing structures, by means of manholes, may be authorized where necessary and feasible.
8. Basic Specifications
  - A. Exposed pipes or sleeves shall be painted or covered with an approved coating that shall match the color of the structure and be maintained to the satisfaction of Caltrans. The permittee shall pay the costs of repainting or protecting the encroachment.
  - B. High pressure systems:
    - 1) Shall conform to API specifications and to ASTM specifications covering sizes and types not covered by API.
    - 2) If operating pressures are over 200 psi:
      - Wall thickness shall conform to CPUC General Orders.
      - Maximum allowable hoop stresses for gas shall be 40 percent of the specified minimum yield strength.
      - Maximum allowable hoop stresses for other high volatile fluids shall conform to ANSI, except that the maximum hoop stress under the "test pressure" shall not exceed 90 percent of the yield strength.
      - A pressure test at 1.5 times maximum operating pressure shall be conducted for 24 hours.
      - Radiographic inspection of all field welds shall be made.
  - C. Sewer lines will not be steel pipe unless corrosion protective measures are provided.
  - D. Other pipelines may be steel, cast iron, ductile iron or approved material.
  - E. Electrical and communication conduits shall conform to CPUC General Orders. High voltage lines are not permitted where the traveling public could be endangered.

**Table 6.5**  
**Additional Encasement Requirements for Utility Facilities Located on Bridges**

Encasement of utility facilities located on bridges must comply with the standard requirements and the following additional requirements:

1. High risk utility facilities must be encased throughout the structure in a steel sleeve.
  - a) The sleeve must have a diameter sufficiently larger than the largest outside diameter of pipe (but not less than 4") to facilitate removal and replacement of the pipe. The sleeve should extend at least 20' beyond the back face of the abutment and 5' beyond the approach slab and wingwalls.
  - b) The space between the pipe and encasement must be vented effectively at each end of the structure so that no pressure buildup is possible. It is not permissible to vent into the earth or backfill material because of explosion possibilities.
  - c) In unusual instances, it may be impractical to provide encasement because of curvature, space limitations, etc. Subject to approval by Office of Structures Maintenance, the wall thickness of the carrier pipe must be increased in such instances.
2. Pipelines conveying water, sewage, and low volatile fluids:
  - a) The pipeline must be encased if it passes over a freeway, primary road or railroad. Other locations where encasement is required are determined by Office of Structures Maintenance.
  - b) A box girder cell may be considered as the encasement for water and non-corrosive material if access is available on the structure for the full length of the pipeline and the carrier is metal pipe.
  - c) To prevent leakage in the pipe from flowing under or around the bridge abutments, the encasement shall extend at least 20' beyond the back face of the abutment and a minimum of 5' beyond the wingwalls and approach slab whichever is greater.
  - d) It may be impractical to provide encasement in unusual instances because of curvature, space limitations, etc., and other safeguards may be required.
3. Electrical and communication lines shall be encased in rigid metallic conduit or other approved material. All electrical conduits shall be grounded according to the General Orders of the California PUC and the Electrical Safety Orders of Cal-OSHA.
4. When not required, encasement should be considered if clearance is impaired or the utility facility is near such hazards as high tension power lines, flood channels, subsiding ground, etc.

## **609 INSTALLING UTILITIES ON TOLL BRIDGES**

Utility encroachments on toll bridges may be approved by the Program Manager, DLP if costs of alternatives are unreasonably excessive and if the proposed encroachment satisfies these conditions:

1. The utility facility is not high risk (such as gas, oil, electrical, chemical, etc.).
2. The utility is lightweight.
3. Regular routine maintenance of the utility is not required.
4. Construction and maintenance of the utility facility is done only during hours approved by Caltrans.

5. The utility facility has a backup system that avoids emergency maintenance and repairs.
6. Granting the utility owner permission to use the bridge does not obligate the Program Manager, DLP to grant permission separately to all other similar utility owners requesting use of the bridge.
7. The utility is governed by the California Public Utilities Commission or is publicly owned, is dedicated to public use, and provides a service to the public.
8. The utility facility provides capacity for other utility owners of the same type of service.
9. An adequate location on the bridge is available to allow proper placement of the utility.

Requests for permits should be sent to the Program Manager, DLP for approval before issuing a permit.

#### **609.1     Limited Space Highway Facility**

A limited space highway facility is defined as a State Facility that the Department has determined to have a limited amount of space available for the installation of Communication Facilities, e.g., toll bridges. The determination of which highway facilities are limited capacity shall be made by Structures, if a bridge, and Design and Local Programs (DLP), if a highway. Once a State highway facility is determined to be a limited space facility the following conditions will apply:

1. The first applicant requesting an encroachment permit for the installation of a communication facility will be required to enter into a Master Agreement for Longitudinal Encroachment on Limited Facilities.
2. The Master Agreement shall contain all of the conditions that govern the installation, operation, use, and maintenance of said communication facility.
3. Each Master Agreement shall be reviewed and approved by Caltrans legal.

#### **610     VEHICULAR TUNNELS AND TUBES**

A public utility facility or other encroachment shall not be permitted within a vehicular tunnel or tube. An encroachment occupying an existing tunnel or tube that is incorporated in a new highway improvement may be allowed to remain under special circumstances with the approval of the Program Manager, DLP. Whenever feasible, the encroachment should be relocated.

#### **611     CABLE TELEVISION**

Privately-owned cable television systems holding city or county franchises may be granted aerial or underground encroachment privileges the same as public utilities, provided that Sections 682-695 of the Streets and Highways Code are met. They may be granted biennial maintenance permits.

Other privately-owned cable television system facilities not covered by city or county franchises may only be attached to existing utility poles or placed in existing underground ducts subject to the owner's consent as set forth in CPUC General Orders.

In any case, use of highway structures is subject to Structures Maintenance approval.

## **612 TELEPHONES**

As a public convenience, Caltrans allows telephones in the right-of-way. An encroachment permit is required for their installation, operation, and maintenance. They are placed only at locations authorized by statutes.

### **612.1 Coin and Credit Card Operated Phones**

Districts may permit coin or credit card-operated telephones in the right-of-way only at rest areas, vista points, park-and-ride lots, truck inspection facilities, and in bus passenger waiting shelters that are located on conventional highways and are equipped to hold the telephones. State statutes and Caltrans policies do not permit coin-operated telephones at other State highway right-of-way locations because telephones are a form of vending that is prohibited by Section 731 of the Streets and Highways Code.

Caltrans, law enforcement, or local agencies may request telephone installations in roadside rest areas, vista points, park-and-ride lots, or truck inspection facilities. Permits are issued to the requesting authority (if not Caltrans) and the installing telephone company at no charge. Local public transit agencies must request permits for telephones in existing and proposed bus passenger waiting shelters.

The maximum number of telephones to be installed at roadside rests, vista points, and park-and-ride lots is determined by the District Landscape Architect in cooperation with Maintenance and Traffic Operations. The California Highway Patrol and Caltrans will agree to the number of telephones needed in truck inspection stations.

Local agencies and law enforcement may request telephones along rural conventional highways when existing facilities and suitable installation locations are not available outside the right-of-way. These telephones must **not** be coin or credit card operated. Permits are issued to the local agency, and an additional permit is issued to the installing telephone company for operation and maintenance.

When a telephone owner requests a permit to maintain existing telephones that were installed without a permit, districts should review the facility for conformance to current policy. When appropriate, the telephones can remain in place and a permit can be issued.

All telephones must provide telephone company operator assistance.

**612.2     SAFE Telephones**

Streets and Highways Code Section 2550, enacted in 1985, authorizes county and regional government bodies to establish Service Authority for Freeway Emergencies (SAFE) agencies. SAFE agencies are ratified by a majority of the cities encompassed by the SAFE jurisdiction. They function as the administrative body to develop, implement, operate, and fund freeway and expressway emergency telephone systems. Systems are installed by locally administered contract under encroachment permit. SAFE funding comes from a one-dollar assessment by the Department of Motor Vehicles on each registered vehicle in the jurisdiction.

SAFE telephones are acceptable on highways included in the freeway and expressway system and connecting highways under jurisdiction of the California Highway Patrol (see Streets and Highways Code 131.1). They also are acceptable in park-and-ride lots as provided in SAFE guidelines. SAFE systems shall connect directly to CHP dispatch.

Only local authorities may propose SAFE systems. Site selection and design are determined by SAFE and the District SAFE Coordinator. After the District SAFE Coordinator accepts the plans as complete, a copy of the plans and the cooperative agreement are sent to the permit engineer for permit issuance. No additional review is required by the permit engineer. Any Caltrans' costs attributed to the project are reimbursed according to the SAFE/Caltrans cooperative agreement.

The encroachment permits issued to SAFE for construction and subsequent maintenance of the project are fee exempt. However, SAFE's contractor shall be charged permit issuance and inspection fees under the double permit process. For additional information on SAFE call boxes see the Publication Titled, "CHP/Caltrans Call Box and Motorist Aid Guidelines."

**613     ENCROACHMENTS NO LONGER IN USE**

Generally, facilities that are no longer in use should be removed from the right-of-way. However, with the approval of the Department, certain underground encroachments may be allowed to remain when: the highway segment is to be abandoned, removal would involve cutting the pavement, removal would seriously disrupt traffic and create a hazard, or when cost of removal exceeds the salvage value and the abandoned facility will not create a significant conflict with future highway improvements.

Facilities made of hazardous materials (such as asbestos) should be removed whenever possible.

Filling abandoned pipes with sand, two-sack slurry cement, or Controlled Low Strength Material (see Appendix H) may be required to protect the highway when pipes are abandoned in place. This requirement is mandatory for metal pipes 12" or larger in diameter and for all other pipes 24" or larger in diameter.



**614 EXCEPTIONS TO POLICY AND STANDARDS**

The Program Manager, Design and Local Programs (DLP)), shall approve any exceptions to Statewide policies and standards governing encroachments within the State highway right-of-way. Table 6.6 lists encroachments that require approval of the Program Manager, DLP. Procedures and requirements for seeking variances and exceptions are discussed in Chapter 3.

**Table 6.6**  
**Utility Facilities Requiring Approval of the Program Manager, DLP**

These utility facility encroachments require approval of the Program Manager, DLP:

<b>Freeways and Expressways</b>	<ul style="list-style-type: none"> <li>• Exceptions to the policy on accommodation of utilities within freeway right-of-way.</li> <li>• Longitudinal encroachments, including underground pipelines, utilities, and utility poles along highways.</li> <li>• Utility support structures, manholes or other appurtenances within access control lines.</li> <li>• All encroachments involving locked gates in access control fences.</li> <li>• Any access to utility facilities from through lanes or ramps.</li> </ul>
<b>Conventional Highways</b>	<ul style="list-style-type: none"> <li>• Longitudinal placement of private facilities</li> </ul>

**615 FHWA APPROVAL**

Requests for installations on all federal-aid highway systems are handled at the district level if they conform to the Code of Federal Regulations, 23 CFR 645, Subpart B. FHWA approvals for utility installations that conform to 23 CFR 645, Subpart B (Appendix C) are approved by Caltrans. FHWA must approve installations not conforming to Caltrans' utility accommodation policy as approved by FHWA.

**616 FRANCHISES (STREETS AND HIGHWAYS CODE 680)**

All proposed city and county franchises and ordinances affecting State highways are processed for review by the district Right of Way Utility Coordinator.

**617 ANNUAL MAINTENANCE**

Annual maintenance of utility facilities (e.g. installation of service connections, routine maintenance, etc.) is authorized by UM or UE permits.

Maintenance work on a utility facility within the right-of-way must be authorized by an encroachment permit kept at the work site. In the absence of the original permit, a copy of the annual UE or UM maintenance permit, whichever applies, will suffice if the maintenance work is according to the current General Provisions and current Utility Maintenance Provisions issued with the original permit. Annual UE or UM maintenance permits may be issued to a utility owner on a district-wide basis for work on conventional highways only. All annual utility encroachment permits are issued directly to the utility owner involved, not to the owner's contractors. This policy includes annual permits for tree trimming by utility owners.

Encroachment permits are required for utility companies to operate and maintain services to State-installed facilities within the right-of-way. Service connections installed within a conventional highway must comply with the utility company's annual permit. A no fee Utility Service (NUS) permit must be obtained by the utility company if the service connection does not qualify under the annual permit. Freeway and expressway service connections having service disconnects, meters, or shut-off valves or switches within the access control lines require the utility owner to obtain a NUS permit for the connections.

Permit inspectors should note the following information on the Encroachment Permit Report regarding work performed under an annual utility maintenance encroachment permit:

- Name of caller and telephone number.
- Permit number.
- Date and time of proposed work.
- Location of work (county and route).
- Type of work to be performed.
- Company work order.

UE Permits allow utility owners to install service connections, additional capacity aerial facilities and perform ordinary maintenance of its facilities located within State highway right-of-way. The UM Permits are more restrictive allowing routine maintenance activities but prohibiting service connection and aerial work. These permits are issued for one or two year periods.

**617.1 Utility Maintenance Provisions**  
**Permit Code UM**

The UM annual permit is a restrictive maintenance permit that allows emergency and routine maintenance of existing utility facilities on conventional highways without the privilege of service connection installations as allowed under the UE permit. Detailed permissible activities under the UM permit are shown in Appendix K.

When a developer submits a permit application to construct a new utility, a one-time fee exempt, “UM” permit is issued to the owner of that utility. This process requires that the utility owner must also apply for an Encroachment Permit, otherwise no permit shall be issued to the developer for any utility installation.

A developer may be required by a city or county to construct service connections that later will be maintained by the utility company. Caltrans' policy for developer installed public utility facilities is discussed in Section 622.

An exception to this policy would be in the case of a service installation only, where the utility owner has a valid “UE” permit for placement of service installations, ownership, and maintenance.

### **617.2     Encroachment Permit Annual Utility Provisions** **Permit Code UE**

“UE” permits authorize utility companies and communication utility companies to inspect, maintain, and repair utility facilities, to make service connections under specified conditions, and to make emergency repairs to remedy any interruption of service to a customer.

Public utilities and public corporations that lawfully maintain a utility facility in State’s right-of-way, may perform routine maintenance and may perform emergency repairs of their facility under the original encroachment permit. Such maintenance must be in compliance with the Special Provisions and the General Provisions incorporated into the encroachment permit, and with Caltrans' current Utility Maintenance Provisions.

“UE” permits authorize communication utility companies to install additional capacity in existing ducts by placing additional cable or replacing an existing cable with a greater cable pair or fiber optics. Authorized work also includes interconnect splicing of existing cable pairs, placement of air flow monitoring transducers and air piping facilities in existing conduits, replacing pull boxes, and reconnection of existing service. Increasing the capacity of existing aerial facilities is also allowed along conventional highways. Utility owners may place new cable or replace existing cable provided the highway is not part of the State Scenic Highway System.

Annual or biennial “UE” utility permits may be issued to public and private utility owners.

Communication utility owners are **not** authorized, under a “UE” Permit, to place conduit or utility vaults in highway rights-of-way, or to make any excavations other than for potholing or service connections under specified conditions.

Utility owners must apply for an encroachment permit to identify their ownership and establish maintenance responsibilities of a utility service lateral within the State right-of-way. The utility company should apply before the property owner is issued an encroachment permit for the

installation. Exceptions are allowed only when UE permits have been issued to the utility owner for service installations, ownership, and maintenance.

A developer may be required by a city or county to construct service connections that later will be maintained by the utility company. Caltrans' policy for developer installed public utility facilities is discussed in Section 622.

### **618 CONVENTIONAL AERIAL** **Permit Code UC**

UC permits authorize aerial facilities on conventional highways. Utility companies may use conventional highway right-of-way when adjacent utility easements or corridors do not exist on private or public property. Pole line cross-arm members or conductors may not overhang private property without an easement, so pole lines generally must be located on public property.

Maintenance of aerial facilities is authorized by UE annual permits. These annual permits allow capacity increases when the carrying pole lines are designed and constructed to accept additional cable or a larger replacement cable and new permits are not required.

Permit inspectors should ensure that aerial cables have the minimum vertical clearance required by the California Public Utilities Commission. CPUC Rule 84-4-A6 indicates communication cables installed longitudinally on conventional highways may have a minimum 16' clearance when they do not overhang the thoroughfare or they are behind established curbs, ditches, or berms. This new clearance applies even when there are connecting driveways, but does not affect the 18' minimum clearance required for public connecting roads.

Supports for overhead lines in conventional highway right-of-way must be as close to the right-of-way line as possible, and in no case closer than 1.5' in back of a curb face. Appendix F provides tables and details showing minimum clearances for aerial utility facilities (For additional information see Highway Design Manual, Topic 309 Clearances).

### **619 FREEWAY AERIAL** **Permit Code UF**

UF permits authorize aerial facilities that cross freeways and expressways. Utility facilities affecting controlled access rights-of-way generally are direct crossings, but they may include existing longitudinal installations approved to remain during construction or by prior permit. These aerial utility facilities may be allowed for their useful life with relocation performed at that time.

When existing facilities are covered by a Joint Use or Consent to Common Use agreement with a utility company, the agreement specifies the utility's right to remain in the freeway and fees associated with the permit. A request for new longitudinal encroachments requires approval by the Program Manager, DLP and normally is not permitted.

Installation or removal of overhead conductors crossing a freeway require traffic control by the California Highway Patrol (CHP) and usually occur on weekend mornings. The CHP can perform a rolling break in traffic on most highways to allow up to a five-minute clearing. These breaks are adequate for simple cable installation. Utility personnel carry the conductors across the freeway lanes and hoist them into place on the opposite side of the freeway.

On larger conductor crossings such as transmission lines, districts may determine that safety nets are needed to prevent transmission lines from falling on traffic during cabling installations. Temporary safety-net support poles are placed at protected locations outside shoulders and in medians. If locations for temporary supports are not available, the utility company may use K-rail and sand barrel crash cushions. After rope nets are strung during CHP traffic breaks other work is then allowed to proceed.

Requirements that apply to transmission line supports for overhead lines crossing freeways are shown in Table 6.7. Consideration should be given to underground facilities when spanning roadways with aerial facilities is not feasible.

**Table 6.7**  
**Requirements for Line Supports for Overhead Lines Crossing Freeways**

Line supports for overhead lines crossing freeways must comply with these requirements, they:

1. Should have a minimum lateral clearance of 30' from the edge of a through lane and 30' from the edge of a ramp lane, when possible.
2. Shall be located outside the right-of-way or between the right-of-way line and access control line if different. Any other placement must be approved by the Program Manager, DLP.
3. Should not be permitted in medians.
4. Should not be permitted on cut or fill slopes.
5. Shall not impair sight distances.
6. Shall be compatible with access requirements.

## **620 UNDERGROUND LONGITUDINAL**

### **Permit Code UK and Permit Code UL**

Districts should classify longitudinal trenching for ducts, mains, directly-buried cable, and multiple service lines as underground longitudinal work. Major underground longitudinal work is authorized under the permit code UK and inspection fees are determined by the AX method (see

Encroachment Permit Fee Schedule). UL permits authorize minor projects with cost for inspection determined by the same method. Individual service installations that require short longitudinal trenching are placed under UE permits. However, when a number of parallel services are proposed, it is preferable to place a distribution facility.

For very large installations (UK Permits), districts may need to require extensive traffic control or detours. Permittees should prepare traffic control plans for Caltrans approval and obtain local approval for detours. Additionally, these large facilities can have extensive shoring. If shoring failures could damage State facilities or if the permit inspector must enter an excavation deeper than 5' , permittees should submit shoring plans and calculations signed by the design engineer for Structures Maintenance approval.

Caltrans' policy for developer installed public utility facilities is discussed in Section 622.

## **621 STATE-REQUIRED RELOCATION**

### **Permit Code UR**

UR permits authorize the relocation of utility facilities when such relocation is required by State highway improvement projects.

For State highway contracts, district Right of Way utilities staff will have the utility owner prepare plans during the design phase for review and approval by the project engineer. Right of Way then prepares a Notice to Owner and sends this notice to Permits along with a copy of the approved plans. The permit engineer should Simplex-stamp the notice and issue an encroachment permit to the Right of Way Utility Coordinator for issuance to the Utility Owner along with the Notice to Relocate. The permit should contain:

- ◆ General Provisions,
- ◆ A reference to the State contract,
- ◆ A brief description of the work,
- ◆ The construction inspector's name, address, and telephone number.

This information is provided on the face of the notice, and the issued permit may mimic the notice to simplify procedures and avoid conflicting statements. Permits sends copies to Maintenance, Construction, and the area permit inspector for information. Construction is responsible for inspection and permit completion.

Section 604 addresses several requirements for utility facility relocations within the State highway right-of-way.

The law governing liability for the cost of relocating utility facilities encroachments is complex and must be interpreted uniformly and fairly. District permits personnel involved with relocation proposals are cautioned not to try to interpret the law.

**621.1     Determining Liability for Permit Fees**

District Right of Way is responsible for determining liability for the cost of relocation. Utility work that is ordered under a Notice to Owner is exempt from encroachment permit fees. Utility owners requesting permits for work to be done in prior property rights' areas, shall also be exempt from all permit fees.

**621.2     Septic Tanks**

Caltrans' policy does not allow any installation of septic tank leach pipes within the State right-of-way.

**621.3     Performing Relocation Work**

Whenever possible, utility facility relocation or protection work that is required by highway improvement or construction shall be performed by the owner before the highway work begins. Arrangements for such work shall be made with the owners by the district Right of Way Utility Coordinator.

**622     SERVICE, POTHOLE, MODIFICATIONS, AND CONNECTIONS  
Permit Code US**

Separate permits for service connections and potholing are issued only when annual "UE" permits are not issued to the owning utility company or in special cases where property owners perform the work. Separate permits are needed for authorized connections in controlled access rights-of-way and when owning utility companies only have "UM" maintenance permits.

Potholing, to determine utility depth before State highway contract work, is handled through a right-of-way issued utility notice and UR permit.

Service connection permits are issued to the utility owner. Caltrans' policy does not allow the installation and maintenance of public utility facilities by private individuals or non-public utility corporations (except for sewer services) because of potential liability.

**The use of State right-of-way by private individuals or non-public utility-corporations that is not authorized by law would be a gift of public funds and therefore prohibited.**

When Caltrans issues a permit for installation of public utility facilities, it does not inspect the installation for compliance with the utility or public corporation standard. Compliance with industry standards is the responsibility of the public utility or public corporation.

Caltrans' policy for developer installed public utility facilities is listed as follows:

**Longitudinal Installation**

1. Permits for installation of longitudinal public utility facilities in the right-of-way are issued to the developer, private individual, or non-public utility-corporation. The permittee's contractor may install the facility under our General Provisions item 4 (see Appendix K).

The developer, private individual, or non-public utility-corporation, assumes responsibility to coordinate submission of an application from the public utility or public corporation for a permit to own, operate and maintain the facility. The installation permit shall not be issued until this application has been submitted.

The public utility or public corporation is not charged a fee for the permit to own, operate, and maintain the facility.

**Service Connection**

2. Permits for installation of public utility service connections' that are transverse in the rights-of-way may be issued to the developer, private individual, or non-public utility-corporation. The permittee's contractor may install the service connection under General Provisions item 4.

Except for sanitary sewer service connections, the developer, private individual, or non-public utility corporation is responsible for coordinating submission of an application from the public utility or public corporation for a permit to own, operate, and maintain the facility. However, a public utility or public corporation having a UE permit is exempt from applying. The installation permit shall not be issued until this application has been submitted.

The public utility or public corporation is not charged a fee for the permit to own, operate, and maintain the facility.

**Transverse Sanitary Sewer**

3. Permits for installation of transverse sanitary sewer service connections in the right-of-way are issued to the developer, private individual, or non-public utility-corporation. No application to own, operate, and maintain is required of the public corporation. The permittee's contractor may install the service connection under General Provisions item 4.



**623 TRENCHLESS TECHNOLOGIES** (Rev 10/03)

**Bore & Jack / Horizontal Directional Drilling / Micro-Tunneling / Pipe Ramming / Pipe Bursting**  
**Permit Code UJ**

The establishment of a “Survey Grid Line” is required on installations with diameters > 30”, and may be required on installations with diameters < 30” if warranted. All transverse-crossings of State Highway right-of-way require encasement.

**623.0 Introduction** (Rev 10/03)

Utility installations and service installations are not permitted within culverts or drainage structures within State highway right-of-way.

The installation of underground utilities within State highway right-of-way shall be performed by the use of a trenchless technology, in most cases. Open-cut installations will only be allowed as a last resort, by issuance of a “UT” permit. The requirement for encasement of utility installations is for the protection of the traveling public and to minimize the amount of disturbance to the structural integrity of the roadbed.

In specific cases encasement may cause a reduction in cathodic protection to the carrier pipe, which may result in corrosion to the pipeline. In these specific cases when authenticated and warranted, encasement of said facility may be waived. Encasement requirements are shown in Table 6.8.

Encasement may be required for longitudinal utility installations within city or county roadways that cross within State highway right-of-way.

**623.1 Bore & Jack** (Rev 10/03)

Utility installations placed by the bore & jack method shall be monitored to ensure that the integrity of the existing roadway elevations are maintained.

Bore & Jack consists of cutting of the soil, generally 6” to 8” ahead of the pipe being jacked simultaneously, by an auger placed within the encasement. The encasement should generally support the integrity of the hole. When the encasement is also to serve as the carrier facility for hazardous materials, the use of another trenchless installation is recommended. Potential damage could occur during the jacking process, rendering the use of that facility as the carrier pipe useless.

**Table 6.8 (Rev 04/05)**  
**Encasement Considerations**

<b>Encasement Requirements based on: Installation Method, Type of Highway Facility, and Material Transported in Carrier</b>						
	Bore and Jack		Directional Drilling		Trenching	
Facility Type	Frwy/Expwy	Conventional	Frwy/Expwy	Conventional	Frwy/Expwy	Conventional
High Risk (Section 605)	Encase	Encase	Encase	Encase	Encase	Encase
Low Risk (Section 605)	Encase	Encase	Encase	Encase	Encase	Optional
Exempt Facilities (Section 605)	Encase	Encase	Optional	Optional	Optional	Optional
Pressurized Fluids	Encase	Encase	Encase	Encase	Encase	Encase
Natural Gas Lines Minimum 7.5' Depth (Appendix H)	Optional	Optional	Optional	Optional	Optional	Optional
Gravity Flows	Encase	Encase	Encase	Encase	Optional	Optional

Note: "Optional" means at the option of the District Permit Engineer. **Transverse crossings require encasement.**

### 623.1A Encasements (Rev 10/03)

**Encasements** that house carrier pipes under pressure shall be steel pipe with a minimum inside diameter sufficiently larger than the outside diameter of the pipe or duct to accommodate placement and removal and shall conform to Caltrans' Standard Specifications. The steel encasement can be either new or used, or of the approved connector system. Used steel casing shall be pre-approved by a Caltrans' representative prior installation.

When the method of Horizontal Directional Drilling is used to install the **encasement**, the use of High Density Polyethylene Pipe (HDPE) as the **encasement** is acceptable. In specific instances the approval of Headquarters Office of Encroachment Permits, may be required.

Reinforced Concrete Pipe (RCP) in compliance of State Standard Specifications is an acceptable carrier for storm drain gravity flow or non-pressure flow. RCP when installed by Bore & Jack shall have rubber gaskets at the joints, and holes for the grouting of voids left by jacking operations (see grouting requirements in # 4 below).

#### **Encasement requirements:**

1. All transverse crossings, **single** ducts or pipes 6" or greater in diameter shall be encased. Installation of multiple **ducts or pipes**, regardless of diameters, shall require encasement (for exceptions see Appendix H).

2. The minimum wall thickness required for steel encasements is based on lengths and diameters of pipes is shown in Table 6.9.
3. Encasement ends shall be plugged with un-grouted bricks or other suitable material approved by the Caltrans' representative.
4. The Caltrans' representative may require the permittee to pressure grout, filling any voids generated in the course of the permitted work. Grouting shall be at the expense of the permittee. Grout holes when placed inside the of the pipe, generally on diameters of 36" or greater, shall be on 8' centers, longitudinally and offset 22 degrees from vertical, and staggered to the left and right of the top longitudinal axis of the pipe. Grout pressure shall not exceed 5 psig for a duration sufficient to fill all voids.
5. There is a spacing requirement when placement of multiple encasements is requested. The distance between multiple encasements shall be the greater of either 24" or twice that of the diameter of the larger pipe being installed.
6. Wing cutters when used shall only add a maximum of 1" in diameter to the outside diameter of the encasement pipe. Voids in excess of the Standard Specifications shall be grouted.
7. A band welded to the leading edge of the encasement pipe should be placed square to the alignment and not on the bottom edge of pipe. A flared lead section on bores over 100' shall not be permitted.
8. The length of the auger strand shall be equal to that of the section of encasement pipe.
9. Encasements placed within conventional highway right-of-way shall extend 5' beyond the edge of the paved shoulder, back of curb, or to the highway right-of-way line.
10. Encasements placed across controlled access right-of-way shall extend to the highway right-of-way lines.

**Table 6.9**  
**Required Thickness for Steel Pipe Casings**

Casing Diameter	Minimum Wall Thickness	
	Up to 150' Length	Over 150' Length
6" to 28"	1/4"	1/4"
30" to 38"	3/8"	1/2"
40" to 60"	1/2"	3/4"
62" to 72"	3/4"	3/4"

**623.1B      Bore and Receiving Pits (Rev 10/03)**

Requirements:

1. Shall be located a minimum of 10' from the edge of pavement in rural areas, or at least 5' beyond the concrete curb and gutter or AC dike in urban areas, or at least 5' beyond the toe of slope of embankments.
2. Shall be located outside of controlled access highway right-of-way. EXCEPT, when approved by the district for direct crossings that are excessively long, or there is restricted space available for placement, outside of the right-of-way. Those portions of the installation not placed by Bore & Jack shall be encased by the open trench method.
3. Protected by placement of 6' chain link fence or Type-K barrier around them.
4. Shored in accordance to Cal-OSHA requirements. Shoring of pits located within 15' of lanes within State highway right-of-way shall not extend more than 36" in height above the pavement grade, unless authorized by a Caltrans' representative.
5. Reflectors shall be affixed to the shoring on all sides facing traffic.
6. Pits shall not affect any State facilities, or create a hazard to the traveling public. Damaged State facilities shall be replaced in-kind or repaired to their original state.
7. All pits should have crushed-rock and sump areas to clear groundwater and water used to clean the casings. Pits shall be lined with filter fabric when groundwater is found and pumping is required.
8. Temporary Type-K railing shall be placed at a 20:1 taper or as otherwise directed by the Caltrans' representative to maintain the integrity of the adjacent travel lane.

A tunnel is defined as any installation that is 30" or larger in diameter (see Section 518, and Table 5.24 - Permit Code TN).

### **623.2** **Horizontal Directional Drilling** (Rev 10/03)

Horizontal Directional Drilling is another trenchless method for the placement of encasement or carrier pipe under, across or within existing highway right-of-way.

#### **623.2A** **BACKREAMER DETECTION**

**JANUARY 1, 2000**, sonde detection on the backreamer is required. (see **Appendix "E"**.)

### **623.2B** **Documentation of Projected Path** (Rev 10/03)

The permittee shall provide a copy of the bore-log showing horizontal and vertical alignment (depth). A bore-log shall be kept for both the pilot bore and the reaming process. These records shall be provided to the Department's representative daily. The bore-log shall depict a plan profile of the actual bore path.

#### **623.2C** **Safety Requirements**

All drilling units **should be equipped with** an electrical strike safety package. This package at minimal **should contain** a warning sound alarm and shall be tested upon setup of the job.

Protective safety gear IS REQUIRED for all members of the contractor's crew, (Die-Electric boots are required. At all HDD operation sites, Safety electric overshoes **shall** be worn by all member's of the crew and by the inspector, at all times.

#### **623.2D** **Permit Application Submittal**

All utilities that are installed by HDD shall provide "As-Builts" upon completion of the job.

The permit application package should contain the following information in support of the permit application; construction plan, site layout plan, project schedule, communication plan, safety procedures, emergency procedures, company experience record, contingency plan and a drilling fluid management plan in support of the permit application.

1. Location of entry and exit point.
2. Equipment and pipe layout areas.
3. Proposed drill path alignment (both plan & profile view).
4. Location, elevations and proposed clearances of all utility crossings and structures.
5. Proposed Depth of cover.
6. Soil analysis \*\*.
7. Product material (HDPE/steel), length, diameter-wall thickness, reamer diameter.

8. Detailed pipe calculations, confirming ability of product pipe to withstand installation loads and long term operational loads including H2O.
9. Proposed composition of drilling fluid (based on soil analysis) viscosity and density.
10. Drilling fluid pumping capacity, pressures, and flowrates proposed.
11. State right-of-way lines, property, and other utility right-of-way or easement lines.
12. Elevations.
13. Type of tracking method/system.
14. Survey Grid establishment for monitoring ground surface movement (settlement or heave) due to the drilling operation.

Note: \*\* *May be waived by the District Permit Engineer on HDD jobs of less than 6" in diameter and on a transverse crossing less than 150' in length.*

**ALL ADDITIONAL PERMIT CONDITIONS SHALL BE SET FORTH IN THE SPECIAL PROVISIONS OF THE PERMIT.**

**The following, outlines recommended depths for various pipe diameters:**

RECOMMENDED MINIMUM DEPTH OF COVER	
DIAMETER	DEPTH OF COVER
2 inches to 6 inches	4 feet
8 inches to 14 inches	6 feet
15 inches to 24 inches	10 feet
25 inches to 48 inches	15 feet

The permittee/contractor shall, prior to and upon completion of the directional drill, establish a Survey Grid Line and provide monitoring.

Upon completion of the work, the permittee shall provide an accurate **“As-Built”** drawing of the installed pipe.

**623.2E      Soils Investigation**

A soil investigation should be undertaken, suitable for the proposed complexity of the installation to confirm ground conditions.

**Definition: Soil Analysis**

**Common sense must be utilized when requiring the extensiveness of the soil analysis.** A soil analysis is required in order to obtain information on the ground conditions that the contractor will encounter during the HDD operation.

If, the contractor can go to the project site and do an excavation with a backhoe to one foot below the proposed depth of the bore, that is a soil investigation. In all cases when an excavation is made in creating of an entrance and exit pit for a HDD project, that is an example of a soil investigation. The HDD process is in itself a continual and extensive soil analysis as the pilot bore is made and it encounters the varying soils and formations the drilling slurry will change colors, therefore providing the contractor with continual additional information.

The purpose and intent of the soil analysis is to assist the contractor in developing the proper drilling fluid mixture, and to ensure Caltrans that the contractor is aware of the conditions that do exist in the area of the proposed project. This prepares the contractor in the event they should encounter a zone of pre-tectonics, and that they would need additives or preventive measures in dealing with inadvertent returns (frac-outs).

The discretion on the extensiveness of the soil analysis is left to each individual District Permit Engineer (DPE) respectfully, for their respective areas. The inspectors play a large role in assisting the DPE in making decisions on the extensiveness. Each individual inspector has a general knowledge of the soil conditions in their area of responsibility.

In many circumstances the soil information has already been prepared, either by Caltrans or by City and County Entities. This information if existing should be provided to the requesting permittee, if there is a structure within 1/2 mile of the proposed project, then Caltrans has already done an extensive soil analysis and the information is stored in our Maps & Records Branch. As-Built, on our freeways and highways provide stationing and detailed information regarding soil information, cut and fill areas.

**623.2F      Determination of Soil Investigations**

The District Permit Engineer (DPE) should determine the extensiveness of the Soil Investigation to be performed based on the complexity of the HDD operation, the DPE may recommend according to the guidelines listed below, a combination of, or modify the guideline to fit the respective area:

**Projects less than 500' in length, where the product or casing is 8" or less in diameter:**

A field soil sampling investigation to a depth of one foot below the proposed drilling.  
a) subsurface strata, fill, debris and material

**Projects less than 800' in length, where the product or casing is 14" or less in diameter:**

A field soil sampling investigation to a depth of one foot below the proposed drilling.  
a) subsurface strata, fill, debris and material  
b) particle size distribution (particularly percent gravel and cobble)

**Projects where the product or casing is 16" or greater in diameter:**

A geotechnical evaluation by a qualified soil engineer to determine the following.  
a) subsurface strata, fill, debris and material,  
b) particle size distribution (particularly percent gravel and cobble),  
c) cohesion index, internal angle of friction, and soil classification,  
d) plastic and liquid limits (clays), expansion index (clays), soil density  
e) water table levels, and soil permeability,

**Projects where the product or casing is 24" or greater in diameter:**

A geotechnical evaluation by a qualified soil engineer to determine the following.  
a) subsurface strata, fill, debris and material  
b) particle size distribution (particularly percent gravel and cobble)  
c) cohesion index, internal angle of friction, and soil classification  
d) plastic and liquid limits (clays), expansion index (clays), soil density, and penetration tests,  
e) rock strength, rock joint fracture and orientation, water table levels, and soil permeability,  
f) areas of suspected and known contamination should also be noted and characterized.

Boreholes or test pits should be undertaken at approximately 250 to 410 feet intervals where a proposed installations greater than 1000' feet in length and parallel an existing road. For road crossings a borehole or test pit shall be undertaken on either side with one or more additional boreholes or test pits in the median where conditions permit. Additional boreholes or test pits should be considered if substantial variation in soil conditions are encountered.

Should the soil investigation determine the presence of gravel, cobble, and/or boulders, care should be exercised in the selection of drilling equipment and drilling fluids. In such ground conditions the use of casing pipes or washover pipes may be required or specialized drilling fluids utilized. Fluid jetting methods used as a means of cutting **should only be considered** where soils have a high cohesion such as stiff clays.

Directional drilled gravity sewers shall only be considered where suitable soil conditions are present. Suitable soil conditions include homogenous soils consisting of clays, silts, silty sands, and sands that would allow for good control of the drill head during the pilot hole drilling.



**623.3 Microtunneling**

Microtunneling is a hybrid of the tunneling industry (miniaturization of tunnel boring machines) and the pipeline industry where pipe jacking has been used for more than 100 years. Microtunneling does not require personnel entry into the tunnel.

**623.3A Introduction**

Microtunneling is a special construction method suitable for many conditions where open cut construction methods are not cost effective, too disruptive, or not physically possible.

**623.3B Microtunneling Permit Application Submittal**

The encroachment permit application package submittal, shall consist of two separate submittals. The first submittal shall be by the Owner of the installation (623.3B). The second submittal required shall be by the owner's contractor, when applying for the "DP" (623.3C).

The encroachment permit application package shall contain a construction plan, site layout plan, project schedule, communication plan, safety procedures, emergency procedure, company experience record, in addition to the information listed as follows:

**The first submittal by the owning agency shall contain the following plans and information:**

1. Drive lengths
2. Proposed depth
3. Shaft; jacking and receiving shafts, manhole construction, shaft backfill, and shoring removal;
  - ◆ Type of shaft;
    - a) Sheet Pile
    - b) Beams and Lagging
    - c) Trench Box
    - d) Auger Drilled and Lined
    - e) Caissons
4. Intermediate jacking stations;
  - ◆ Number of Stations;
    - a) Required by Specifications
    - b) On site
5. Geotechnical; including ground water information
  - ◆ Geotechnical evaluation by a qualified soil engineer to determine the following;
    - a) Boring logs & plan locations of borings and cross sections, Subsurface strata, fill and ground water elevations
    - b) Particle size distribution (particularly percent rock and cobble),
    - c) Cohesion index, internal angle of friction, and soil classification,

- d) Plastic and liquid limits (clays), expansion index (clays), soil density, and penetration tests,
- e) Rock strength, rock joint fracture and orientation, water table levels, and soil permeability,
- f) Areas of suspected and known contamination should also be noted and characterized.
- ◆ Should the soil investigation determine the presence of rock, cobbles, and/or boulders, determination of the following information would be required;
  - a) Depth and extent of rock
  - b) Rock type
  - c) Rock strength
  - d) Rock joint/fracture spacing
  - e) Hardness
  - f) RQD
  - g) Estimated range of sizes & frequency of occurrence of cobbles and boulders.

Boreholes or test pits for road crossings shall be undertaken on both sides with one or more additional boreholes or test pits in the median where conditions permit. Additional boreholes or test pits should be considered if substantial variation in soil conditions are encountered. Where a proposed installation parallels an existing road, boreholes or test pits should be undertaken at approximately 250 to 410 feet intervals.

### **623.3C      Contractor's Submittal**

**The second submittal by the owner's contractor shall contain the following plans and information:**

1. Shaft; soil stability at portals and ground improvement.
2. Dewatering plans for jacking and receiving shafts, if any.
3. Shoring design for jacking and receiving shafts.
4. Survey control plan: lasers, laser mounting, laser checking.
5. Ground surface settlement monuments and subsurface settlement monuments monitoring program plan.
  - ◆ Buried points
    - ◆ Rebar points, or
    - ◆ MPBX (Multi-point borehole extensometers)
6. Recycling information; slurry mix and polymer additives, slurry separation plant type, and spoils disposal;
  - ◆ Removal of slurry in dump trucks.
  - ◆ Removal of slurry in tankers.
  - ◆ Settlement ponds.
  - ◆ Muck piles on site.
7. Contingency plan information;

- ◆ Ground improvement plans when required at portals and/or behind thrust block/reaction wall due to weak and unstable soil conditions.
- ◆ Obstruction removal through emergency (911) shafts or other means.
- ◆ Mechanical breakdowns and recovery of the MTBM through 911 shafts or other means.
- ◆ Control of hydrofracture and slurry loss.
- ◆ Remediation of loss of ground and excessive ground surface settlement.

**623.4 Pipe Ramming** (Rev 10/03)

**Pipe Ramming pit requirements are identical to those for Bore & Jack.**

**Establishment of a survey-grid line is required.**

Before any project begins, exploration bore-holes and a complete geotechnical investigation shall be conducted to determine possible difficulties in order to determine the drilling trajectory.

The casing shall be rammed open ended, except when the diameter is 6" or smaller. Pipes 6" or smaller may be rammed open ended or closed.

A soil shoe may be installed on the leading edge of the casing, either by fabrication on site or obtained from the manufacturer. A soil shoe shall not be utilized on those installations at depths or 18" or less from the surface.

Lubrication shall only be utilized to reduce friction and increase production. The amount of lubrication directed to the outside of the pipe shall only be of a sufficient amount required to fill the void between the outside of the pipe and soil, as created by the soil shoe.

Lubrication to the inside of the casing shall only be an amount adequate to assist in spoil removal when the ram is completed.

Welding of the casing at joints shall be as per the manufacturer's recommendations.

The use of straps at each joint on pipe diameters of 12" or larger is required as is the use of the manufacturer's specified welding wire or rod.

Spoil removal for rammed encasements of 30" in diameter or less, may utilize pressurized air or water.

Air pressure shall not exceed 150 psi and water pressure shall not exceed 300 psi.

Encasements larger than 30" in diameter shall have the spoils removed by other means than by pressurizing of the pipe, such as, manual, auguring, vacuum, washing or other means.

The Receiving Pit shall be steel plated entirely when the spoils are to be removed from within the encasement by means of air or water pressurized methods.

**623.5 Pipe Bursting** (Rev 10/03)

**Pipe Bursting operations generally are only performed by the owning utility when they have exceeded the operating capacity of their existing facilities. In most cases pipe bursting allows the utility owners the advantage of upgrading their existing facilities by up to 50%.**

On installations of diameters 12" or greater it is necessary to establish a survey-grid line and establish the existing elevation points over the existing area of installation.

A soil analysis should be required and review of the information to identify any locations of difficulty, density, water table, changes in soil formation that could present or create greater friction resistance.

Request information of the proposed project as to:

1. the ratio of the proposed upgrade to determine difficulty, generally up to 25% increase in diameter is common. An increase of 25% - 50% is considered challenging, and an increase of 50% or greater is considered experimental.
2. the existing depth of cover, "rule of thumb" depth of cover should be at least 10X the difference in the upgrade of the existing diameter to be burst.
3. whether or not the existing line has been viewed by video, do not allow line to be burst blind.
4. is this proposed line straight or are there bends in the line.
5. if bends are existing in the line, the location of the bend will have to be excavated and new pits re-established at those locations.
6. require that the contractor provide a list of equipment to be on site to handle an emergency, in the event that bypass pumping is required to maintain the existing service in the event of a problem.
7. as to what method will be utilized (static, pneumatic, burst and jack, or hydraulic).

**623.6 Tunneling - Rib & Lagging** (Rev 10/03)

NOTE: All projects will vary in their own characteristics. General similarities are listed below to provide a general understanding of these types of projects.

Establishment of a survey-grid line and existing elevation points shall be over the centerline and wing points of the installation.

Designed plans and specifications, calculations and details (liner plates, rib & lagging, bracing, etc.) shall be stamped by a Registered Structural Engineer, or a Registered Civil Engineer, with a minimum of five (5) years experience in sub-structural design of tunnels. Proof of experience shall be submitted on "Certification of Structural Experience," form TR-0133, in conjunction with project package submittal.

A geotechnical investigation and soil analysis by a licensed geotechnical engineer/engineering geologist is required. It shall provide identification of any locations of difficulty, changes in soil formation, or mixed face conditions that could present or create ground loss, exploratory soil corings and logs are required along the tunnel alignment at intervals of twenty-five to one-hundred feet {25' to 100'}.

When the length of the tunnel is greater than four hundred feet (> 400'), alignment holes may be required. Alignment holes shall be drilled at a maximum spacing of two-hundred feet (200') and a casing of four to six inches (4" to 6") in diameter installed vertically, to a depth necessary for the installed casing to extend into the tunnel excavation. When alignment holes fall within the pavement area of the roadway, the pavement shall be saw-cut, a cover shall be placed over the end of the casing at grade, and the space around the casing within the roadway filled with concrete (EXCEPT in controlled access right-of-way).

**623.6A CAL/OSHA Requirements** (Rev 10/03)

The California Code of Regulations (CCR) mandates the following requirements for Tunneling Projects.

The Owner or Local Entity proposing the construction of the tunnel shall make a full submittal to the Department of Industrial Relations, Cal/OSHA, to determine tunnel classification (CCR 8422).

Development of a check-in/check-out procedure to ensure an accurate account of personnel underground in the event of an emergency (CCR 8410).

Development of an Emergency Plan, that outlines duties and responsibilities of all personnel on the project during an emergency. The plan shall include ventilation controls, fire fighting equipment, rescue procedures, evacuation plans and communications (CCR 8426).

Cal/OSHA requires a State of California certified person performing the duties of gas tester or safety representative to be certified by passing a written and an oral examination administered by the Cal/OSHA Mining & Tunneling Unit (CCR 8406(f), (h)).

A certified safety representative shall direct the required safety and health program and must be on-site while employees are engaged in operations during which the Tunnel Safety Orders (TSO) apply (CCR 8406(f)).

The certified safety representative must have knowledge in underground safety, must be able to recognize hazards, and must have the authority to correct unsafe conditions and procedures subject to the TSO (CCR 8406(f)).

A State of California certified gas tester is required for the following operations:

- All classifications other than non-gassy
- Projects during which diesel equipment is used underground
- Hazardous underground gas conditions (CCR 8470).

#### **623.6B**      **Tunnel** (Rev 10/03)

Tunnel construction is accomplished by the method of Hand-mining, or by Mechanical means, and the use of a protective shield.

Continuous monitoring and observation of the ground surface above the tunnel is required. In some cases it may be required to survey and record elevations along the survey grid line, several times a day, or daily.

Generally, when tunneling in good ground, tunnels with a diameter of less than eight-feet (< 8') and less than three-hundred feet to four-hundred feet (300' to 400') in length may be holed-through (excavated completely) before concreting the interior of the tunnel, when placement of pre-fabricated or pre-cast pipe is to be installed. When this is proposed, hole-through (unsupported length) before concreting of the interior of the tunnel, it shall be justified by the original subsurface geotechnical investigation and design.

Tunnel lining and bracing should consist of steel ribs and steel spreaders (dutchmen) with wood, concrete, or steel lagging, or with bolted steel liner plates.

Fireproof materials should be utilized in all construction of plant structures, above ground, within one hundred feet (100') of the shaft or tunnel. The use of flammable materials or wood shoring would require that adequate fire protection be provided.

Ventilation systems shall be established and provide a minimum of two hundred (200) cfm per worker.

- All equipment shall maintain a minimum clearance of twenty-five feet (25') from opening.
- An established contingency plan in the event of ground loss.
- Cranes utilized in operations shall maintain minimum required clearances.

**623.6C**      **Tunnel Shield** (Rev 10/03)

- The face of the shield shall be provided with a hood or an approved grid system.
- The excavation face shall have a sufficient length to allow for the installation of one (1) complete ring of liner plates, or one (1) complete set of ribs and lagging before advancing.
- The contractor shall submit details and design information of the shield.

**623.6D**      **Tunnel Lining** (Rev 10/03)

Tunnel lining and bracing should consist of steel ribs and steel spreaders with wood lagging and concrete, or steel lagging, or with bolted steel liner plates.

The tunnel liner and bracing shall be designed (calculations provided) of an adequate strength based upon the geotechnical investigation, soil analysis, loading, and the diameter and depth of cover to provide adequate support of the tunnel.

- A ring expander shall be used to expand the rib continuously outward and upward.
- Liner plates shall be designed based on joint strength, minimum stiffness, critical buckling of the liner plate wall, and deflection or flattening of the tunnel section.
- On tunnels with a diameter greater than ten feet ( $> 10'$ ), the placement of ribs inside of liner plate may be required.
- When the geotechnical investigation has determined that silts and fine sands exist, that may flow under pressure, all liner plates shall include a neoprene gasket adhered to each flange face.

**623.6E**      **Lagging** (Rev 10/03)

Lags are generally started at spring line and continue upwards towards the crown.

Lag spacing consists of three methods:

1. Wedging – done by driving a block of wood between the earth and the lag at each end, or by driving a wedge between the rib and the lag.
2. Stops – by welding small angles to the ribs outer flange to prevent sliding.
3. Clamps – which are applied to wood or steel lags.

If the spacing of lags between ribs is used in tunnel construction, packing between lags with filler may be required.

- Lags are boards of steel plates placed longitudinally against the roof and walls of the tunnel excavation.
- Steel lagging may consist of channel, liner plate or corrugated metal.
- Steel lagging thickness shall be designed on strength based upon the geotechnical investigation, soil analysis, and loading.

- Wood lagging thickness shall be designed on strength based upon the geotechnical investigation, soil analysis, loading. Generally wooden lags common size are three-inches by six-inches (3" x 6"), and the length is cut according to the spacing of the ribs.
- A minimum of one liner plate per ring with a two-inch (2") diameter coupling for grouting is required.

**623.6F**      **The Construction of Shafts / Pits** (Rev 10/03)

Shafts / pits should be constructed of a proper size and shape, and equipped as to allow work to be carried on safely.

- Shafts shall be constructed of driven steel sheet pilings, steel bracing and tight wood, or steel lagging or steel liner plates and ribs.
- The removal of spoils should be accomplished by mechanical means (muck box).
- All shafts shall be provided with guardrail and a toeboard.
- When ladders are utilized within the shaft or pit, cages and/or safety devices shall be provided on depths of fifteen to twenty feet (15' to 20'), platforms shall be provided at depths of greater than twenty feet (20'+).
- Ventilation systems shall be established and provide a minimum of two hundred (200) cfm per worker.
- All equipment shall maintain a minimum clearance of twenty-five feet (25') from openings.
- Upon completion of project all shafts, pits and drifts that are not part of the finished product shall be backfilled.

**623.6G**      **Placement of Shafts / Pits** (Rev 10/03)

Shafts / pits shall be:

- Located a minimum of ten feet (10') measured laterally from the edge of pavement on conventional highways in rural areas.
- Located at least five feet (5') measured laterally beyond the concrete curb or AC dike on conventional highways in urban areas.
- Located at least five feet (5') measured laterally beyond the toe of slope of embankments.
- Located outside of controlled access right-of-way.
- Adequately fenced or have a Type-K barrier placed around them at a 20:1 taper or as otherwise directed.
- Shored according to Cal-OSHA minimum requirements. Located within fifteen feet (15') of traffic lanes on a State highway shall not extend more than thirty-six inches (36") above the pavement grade unless otherwise authorized by the State representative. Reflectors shall be affixed to the sides facing traffic, and placement around the perimeter of a six-foot (6') chain link fence during non-working hours.
- Are only allowed in controlled access right-of-way for direct freeway crossings that are excessively long or that have restricted space available outside the rights-of-way.



- They shall not Affect State facilities or create a hazard to the traveling public. When placement is approved within controlled access rights-of-way, damaged State facilities shall be replaced or repaired according to State Standard Specifications.
- Shall have crushed-rock and sump areas to clear groundwater and water used to clean. They shall be lined with filter fabric when groundwater is found and pumping is required.

**623.6H      Excavation (Rev 10/03)**

In some locations Soil Stabilization may be required. It may become necessary at the direction of the Engineer to either pressure grout or freeze the soil area of the project to control water, to prevent loss of ground, to prevent settlement or displacement of an embankment. When required, a Registered Geotechnical Engineer shall prepare and stamp the plans determining the material and method for use.

In some projects masonry sections are installed, the amount of excavation of the tunnel should not exceed the amount needed for placement of a full masonry section after all lining is in place.

All excavated material shall be considered as unclassified material.

- In the event of any ground movement over or adjacent to construction, all work shall be suspended, except that which will assist in making the construction site secure and prevent any further additional movement of the ground.
- Excavation should not be advanced beyond the edge of the shield, except in rock.
- The geotechnical engineer/engineering geologist shall determine the allowable amount of tunnel length unsupported by bracing, based on the geotechnical investigation and design.
- All voids between the excavation and the liner shall be grouted after setting of ribs and lagging, if not expanded to full contact with the surrounding ground, as determined by the Safety Engineer.
- A log shall be maintained of all surrounding utilities and facilities.

**623.6I      Dewatering (Rev 10/03)**

When ground water is anticipated, pumps of sufficient capacity to handle the flow shall be maintained at the site. Observation shall be maintained to detect any settlement, displacement or washing of fines into the pit, shaft or tunnel.

**623.6J      Grouting (Rev 10/03)**

Grouting should be kept close to the heading (working front of tunnel).

It may be required to add pea-gravel and fly ash to the grout. The pea-gravel would assist in consolidation and the filling of the voids, fly-ash works as a lubricant allowing the grout to free-flow.

- The use of grout stops may be utilized if necessary or if required by the Safety Engineer.
- Grouting shall be performed when ordered by the Safety Engineer.
- At no time shall progression of the tunnel exceed six feet (6') beyond the grouting of the exterior void.
- Pressure on the grouting gauge should not exceed the capacity of the lining, sufficient to fill all voids.
- A gauge shall be provided which will accurately indicate working pressure and shall be monitored constantly during grouting procedures.
- Grouting shall start at the lowest point and proceed upwards simultaneously on alternating sides.
- When grouting is complete at that location a threaded plug shall be installed into the coupling.

**623.6K**      **Materials** (Rev 10/03)

The form "Notice of Materials to be used," form CEM-3101 is required.

- The manufacturer shall provide a Certificate of Compliance, to ensure tensile and yield strengths.
- Steel lagging may consist of channel, liner plate or corrugated metal.
- Steel lagging thickness shall be designed on strength based upon the geotechnical investigation, soil analysis, and loading.
- Wood lagging thickness shall be designed on strength based upon the geotechnical investigation, soil analysis, loading. Generally wooden lags common size are three-inches by six-inches (3"x 6"), and the length is cut according to the spacing of the ribs.
- When the geotechnical investigation has determined that silts and fine sands exist, that may flow under pressure, all liner plates shall include a neoprene gasket adhered to each flange face.
- Ensure Manufacturer's Specification Data Sheets (MSDS) are provided stipulating recommended:
  - Specifications of steel spreaders (spacing, tolerances).
  - Specifications of steel rib (section lengths, spacing, etc.)

**623.6L**      **Project Owner/Permittee Responsibilities** (Rev 10/03)

The project owner/permittee is responsible for providing:

A full-time Safety Engineer;

Shall be a Registered Structural Engineer, or a Registered Civil Engineer, with a minimum of five years experience in sub-structural design or inspection of tunnels. Proof of experience shall be submitted on "Certification of Structural Experience," form TR-0133, **OR**

A full-time Safety Representative;

State certified by Department of Industrial Relations, Cal/OSHA, proof of certification is required.

Cal/OSHA requires persons performing the duties of gas tester or safety representative to be certified by passing a written and an oral examination administered by the M&T Unit. CCR 8406(f), (h)

- Project drawings and specifications, calculations and details stamped by a Registered Structural Engineer, or a Registered Civil Engineer, with a minimum of five (5) years experience in sub-structural design of tunnels.
- An geotechnical investigation by a licensed geotechnical engineer to determine the following;
- Storm Water Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan (WPCP).
- De-Watering Plan, if needed.
- Ground water information
- Boring and soil analysis logs, location plan of borings, cross sections, subsurface strata, fill and ground water elevations;
  - Particle size distribution (particularly percent rock and cobble),
  - Cohesion index, internal angle of friction, and soil classification,
  - Plastic and liquid limits (clays), expansion index (clays), soil density, and penetration tests,
  - Rock strength, rock joint fracture and orientation, water table levels, and soil permeability,
  - Areas of suspected and known contamination should also be noted and characterized.
- The soil investigation shall also determine the presence of rock, cobbles, and/or boulders, and the following;
  - Depth and extent of rock
  - Rock type
  - Rock strength
  - Rock joint/fracture spacing
  - Hardness
  - RQD
  - Estimated range of sizes & frequency of occurrence of cobbles and boulders.

#### **623.6M**      **Contractor's Responsibilities** (Rev 10/03)

The contractor is responsible for providing:

- Tunnel project construction plans and specifications, calculations and details, method of construction, to include the adequacy of the shield and liner material stamped by a Registered Structural Engineer, or a Registered Civil Engineer, with a minimum of five (5) years experience in sub-structural design of tunnels.
- “Notice of Materials to be used,” form CEM-3101.
- Method of construction plan.

- A Licensed Surveyor.
- Proof of rib expanders and/or liner supports.
- Working schedule of the project.
- Contingency plan for dealing with ground loss work.
- Shaft; soil stability at portals and ground improvement plan.
- Dewatering plans for entry and exit shafts/pits, if needed.
- Installation and monitoring of SWPPP or WPCP facilities and conditions.
- Shoring design for entry and exit shafts/pits.
- Survey control plan: lasers, laser mounting, laser checking.
- Ground surface settlement monuments and subsurface settlement monuments monitoring program plan.
  - Buried points

### **623.6N**      **Key Points of Inspection** (Rev 10/03)

Meet and confer with the Safety Engineer hired by the Owner/Permittee, explain exactly what is expected and required on a daily report, and any issues of concern.

State Representative and Safety Engineer/Safety Representative, together both should:

1. Review the geotechnical investigation.
2. Review the emergency and contingency plans.
3. Inspect the roadway and shoulder area for existing cracks in the ground and mark them.
4. Inspect the area for all-existing utility facilities and sub-structures.
5. Check and confirm any requirements or concessions requested by any Utility companies with the owner and the contractor.
6. Ensure that a Survey Grid line has been established over proposed alignment of tunnel.
7. Make a determination on the frequency of surface monitoring that will be required, and identify what would constitute additional monitoring and/or surveying.
8. Inspect and ensure there is sufficient space for the staging area, that equipment and workers can work safely.
9. Establish the limits of minimum clearance.

Safety Engineer/Safety Representative – start of project and construction of shafts/pits.

- A. Request to see OSHA permit and tunnel classification sheet.
- B. Ensure the contractor has equipment on site to handle an emergency, and in the event that ground loss occurs.
- C. Inspect installation of SWPPP or WPCP facilities and conditions.
- D. Have knowledge of the soil conditions, density and water table (sand, clay, cobble, etc.).
- E. Inspect the shafts/pits for Cal OSHA (trenching and shoring) requirements.
- F. Ensure that guardrails and toe-boards are secured around shafts.
- G. Ensure the flooring of the shaft/pit is lined with gravel or ballast rock.
- H. Ensure that the sump pumps setup and that they are adequate for dewatering.

- I. Ensure all electrical cords and facilities are properly secured.
- J. Inspect materials to be used against list provided by contractor.
- K. Obtain receipt of the certificates of compliance from the manufacturer on all materials delivered and to be used for the project.
- L. Ensure that ventilation system is adequate and installed.
- M. Ensure a location is designated for spoils, that they are adequately stockpiled and removed.

Safety Engineer/Safety Representative – daily inspection

- 1. Ensure that laser is verified every morning prior to start of work.
- 2. Inspect SWPPP or WPCP facilities and conditions
- 3. Check traffic control, signs and delineation.
- 4. When warranted request line to be re-surveyed to determine heaving or subsidence, if greater than 0.2" take corrective measures.
- 5. Visually inspect gauge during grouting operations.
- 6. Inspect ventilation equipment, request copies of contractor's records of maintenance.
- 7. Ensure safety equipment is worn at all times by everyone.
- 8. Notify State Representative in the event of an incident or accident.
- 9. Ensure that all excavations are adequately protected with Type-K barrier and chain link fence around them or covered with steel plates.

State Representative and Safety Engineer/Safety Representative – close of project

- A. Upon completion, visually inspect the area of installation, highway and shoulder area to ensure no new cracks, heaving or subsidence have occurred.
- B. Require line to be re-surveyed to determine heaving or subsidence.
- C. Ensure that all excavations were backfilled.
- D. Work site and staging areas are restored to their original condition.
- E. Establish a checklist if necessary for completion points (i.e. repairs or corrections).

**623.7 PROCEDURAL REQUIREMENTS FOR STRUCTURAL AND SUB-STRUCTURAL DESIGN AND CALCULATIONS (Rev 10/03)**

All submittals shall be stamped by a Registered Structural Engineer, or a Registered Civil Engineer, with a minimum of five years experience in structural design and preparation of calculations, proof of experience is required by use of Encroachment Permits form "Certification of Structural Experience," TR-0133, to be included within the project package submittal.

Sub-structural projects may consist of, but are not limited to; drainage boxes & systems, tunneling projects (mechanical or manual tunnel excavations for the placement of tunnel supports), and Trenchless Technologies for the installation of utilities when the diameter is 30" or larger (jack & bore, micro-tunneling, horizontal directional drilling, or pipe-ramming).

**623.7A      Structural Design and Calculations (Rev 07/05)**

All Structural Project submittals (structures and structural falsework) will require review by Division of Engineering Services (DES), for construction under an encroachment permit and require the following:

- Designed plans and specifications, calculations and details (structural and falsework).
- A geotechnical investigation and soil analysis by a licensed geotechnical engineer is required. It shall provide identification of any locations of difficulty, changes in soil formation, or mixed face conditions that could present or create ground loss, exploratory soil corings and logs are required along the alignment of the project.

Construction or Structures Construction will review falsework and shoring submittals.

Submittals may be routed through Structure Maintenance.

**623.7B      Sub-structural Design and Calculations (Rev 07/05)**

When the distance between a tunnel and an existing structure is less than twenty times the tunnel's diameter, it shall be sent to Division of Engineering Services (DES) for review of the potential lateral loading effects to the pilings and foundation. As in Section 623.7A, submittals may be routed through Structure Maintenance.

Otherwise, Sub-structural Project submittals, listed below and submitted with the "Certification of Experience," TR-0133, **do not** require review by DES.

1. Micro-tunneling projects.
2. Bore & Jack, HDD, or Pipe Ramming (diameter is 30" or larger and requiring structural/sub-structural design, investigations and calculations)
3. Tunneling for the placement of tunnel support systems (rib & lagging, or steel liner plate requiring structural/sub-structural design, investigations and calculations).
4. Drainage boxes and systems.

All Sub-structural Project submittals require the following:

- The District Encroachment Permits Office is responsible for verification of the Registered Engineers stamp, validation of the date of expiration against the dated plan set and calculations. The permit office engineer shall validate the RE's stamp at the web site listed below, by entering the RE's number. A copy of the results shall be printed and included within the permit file. The encroachment permit may be issued, upon completion of the normal review process (Traffic, Environmental, R/W, etc.).

[http://www2.dca.ca.gov/pls/wllpub/wllqryna\\$lcev2.startup?p\\_qte\\_code=ENG&p\\_qte\\_pgm\\_code=7500](http://www2.dca.ca.gov/pls/wllpub/wllqryna$lcev2.startup?p_qte_code=ENG&p_qte_pgm_code=7500)

- Designed plans and specifications, calculations and details (liner plates, rib & lagging, bracing, etc.).
- A geotechnical investigation and soil analysis by a licensed geotechnical engineer is required. It shall provide identification of any locations of difficulty, changes in soil formation, or mixed face conditions that could present or create ground loss, exploratory soil corings and logs are required along the alignment of the project.
- When the length of the tunnel is greater than four hundred feet (> 400'), alignment holes may be required. Alignment holes shall be drilled at a maximum spacing of two-hundred feet (200') and a casing of four to six inches (4" to 6") in diameter installed vertically, to a depth necessary for the installed casing to extend into the tunnel excavation. When alignment holes fall within the pavement area of the roadway, the pavement shall be saw-cut, a cover shall be placed over the end of the casing at grade, and the space around the casing within the roadway filled with concrete (EXCEPT in controlled access right-of-way).

**623.7C** **Project Owner's Responsibilities** (Rev 10/03)

On projects deemed by the Department as requiring full time inspection, the project owner is responsible for providing a third-party full time inspector.

On projects over 30" in diameter and deemed as requiring full time inspection, the project owner is responsible for providing:

A full-time Safety Engineer:

A Registered Structural or Civil Engineer, with a minimum of five years experience in design or inspection of Sub-structural Projects (tunnels). Proof of experience shall be submitted on Encroachment Permits form "Certification of Structural Experience," form TR-0133,

**OR**

A full-time Safety Representative:

**State certified by Department of Industrial Relations, Cal/OSHA Mining & Tunnel Unit, proof of certification is required. California Code of Regulations 8406(f), (h)**

**623.7D** **Contractor's Responsibilities** (Rev 10/03)

Prior to issuance of the "DP" permit the following shall be submitted:

- Proof of experience, as stipulated by the District Office, in respect to diameter and length of proposed project.
- Tunnel support system construction plans and specifications, calculations and details, method of construction, to include the adequacy of the shield and liner material stamped by a Registered Structural Engineer, or a Registered Civil Engineer, with a minimum of five (5) years experience in sub-structural design and preparation of calculations.
- "Notice of Materials to be used," form CEM-3101.
- Method of construction plan.



- A Licensed Surveyor.
- Proof of rib expanders and/or liner supports.
- Working schedule of the project.
- Contingency plan for dealing with ground loss work.
- Shaft; soil stability at portals and ground improvement plan.
- Dewatering plans for entry and exit shafts/pits, if needed.
- Installation and monitoring of SWPPP or WPCP facilities and conditions.
- Shoring design for entry and exit shafts/pits.
- Survey control plan: lasers, laser mounting, laser checking.
- Ground surface settlement monuments and subsurface settlement monuments monitoring program plan.
  - Buried points

#### **624 OPEN-CUT ROAD (Rev 10/03)** **Permit Code UT**

Encroachment Permit policy dictates that underground installations and crossings within State highway right-of-way shall be performed by methods of trenchless technologies, either Bore & Jack, HDD, Micro-Tunneling, Pipe Bursting or Pipe Ramming, unless specified otherwise by permit. Open trenching is authorized only when the applicant demonstrates that all alternatives have been investigated and that installation by a trenchless technology is not feasible. Procedures that shall be followed in evaluating applications for open trenching are shown in Table 6.10.

The Reclamation Board, in maintaining the integrity of the State's levee system, issues permits for construction of facilities within the levee prism. Caltrans and the Reclamation Board cooperatively have developed procedures for controlling installation of underground facilities where a State highway is on or crosses a levee. The Board prefers open cut highway crossings to ensure the integrity of the levee. Caltrans issues permits that conform to Board requirements.

Authorized open trenching must be noted clearly in the encroachment permit or permit rider. Traffic controls must conform to State standards and recommendations of Highway Operations or Permits. Unless otherwise specified in the permit, work must be accomplished one lane-width at a time on conventional two-lane highways. If determined acceptable, two lanes of a multi-lane highway may be used for the work when one full lane width in each direction is available for traffic. Trenching, backfilling, and paving operations shall conform to Caltrans' standards.

Transverse trenching is not authorized on freeways or expressways without headquarters approval as an exemption to policy.

##### **624.1 Backfill of Excavations and Trenches**

Backfilling of excavations and trenches shall comply with Caltrans Standard Specifications. The specification for Controlled Low Strength Material (CLSM) is shown in Appendix H.



**Table 6.10**  
**Procedures for Evaluating Proposals for Open Trenching**

Follow these procedures to evaluate applications for open trenching:

1. The applicant shall supply these items for consideration by the permit engineer:  
 Profile plans or cross-sections showing the locations of all existing utilities, culverts, or other permanent installations which restrict the bore.  
 Soils information showing that trenchless technologies, such as Bore & Jack or HDD is not feasible.  
 Detail plan showing detailed restrictions.  
 Any other information indicating that trenchless technologies are not allowable methods in the area.
2. A design change is mandatory when the crossing location can be changed to allow boring and jacking and not affect the function of a facility.
3. Trenched crossings of connecting local streets and public roads where traffic is not adversely affected is acceptable with concurrence of the local agency that owns the public connection.
4. Casing in open trenches may be required for future maintenance or added facilities.
5. The District Permit Engineer will review submitted materials to determine if the request is reasonable. Reviewing units may include:  
 Environmental, Field Inspection, Highway Operations--Traffic Operations, Maintenance  
 Materials Engineering, Project Development, Right of Way Utilities

## **625 MINIMUM CARRIER PIPELINE SPECIFICATIONS**

Caltrans' minimum specifications for pipelines carrying materials are described in Table 6.11. Carrier pipe materials shall conform to industry and California Public Utilities Commission requirements.

## **626 ENCASEMENT AND PROTECTION REQUIREMENTS**

Specific requirements for the encasement and protection of utility facilities are shown in Table 6.12, examples of mechanical protection of utility facilities are shown in Figure 6.1.

Table 6.13 indicates when to consider encasement of carriers that are exempt from encasement requirements

**Table 6.11**  
**Minimum Carrier Pipeline Specifications**

Pipeline encroachments must comply with these minimum specifications:

1. Metal Pipe
  - A. Gas transmission and distribution piping systems shall conform to General Order No. 112D of the California Public Utilities Commission, and applicable provisions of Title 49, Code of Federal Regulations.
  - B. Other fluids under pressure shall conform to the American National Standard Code for Pressure Piping.
  - C. Cast iron pipes shall conform to Caltrans' Standard Specifications.
  - D. Metal underground encasements shall conform to Caltrans' Standard Specifications.
2. Concrete and Asbestos Cement Pipe
  - A. Shall not exceed the manufacturer's recommended pressure.
  - B. Shall conform to Caltrans' Standard Specifications. Requirements for underground culverts stated in Caltrans' Highway Design Manual shall also apply.
  - C. Uncoated sewer pipe that is located under the highway shall be designed to flow full to protect against attack from generated acids.
3. Plastic Pipe (HDPE)
  - A. Specifications shall ensure that the type of pipe is adequate for the intended purpose (see CPUC General Orders).
  - B. A means for detection of nonmetallic material shall be provided.
4. Pipe Joints
  - A. Shall be watertight under pressure and foreseeable conditions of expansion, contraction, and settlement.
  - B. Recommended joint sealants include rubber, neoprene and similar synthetic products.
  - C. Mortar, grout, or other portland cement materials are not allowed as joint sealants.
5. Water and sewage pipelines shall conform to CPUC General Orders.
6. Markers required under the permit provisions should be placed so they do not interfere with vehicle recovery areas.
7. Pipelines carrying hazardous materials can be required to have corrosion control measures as outlined in the appropriate federal or State CPUC regulations. Evidence of compliance must be submitted before issuance of an encroachment permit.
8. Specifications for pipelines on bridges are discussed in the Sections titled, "Encroachments on Structures" and "Installation on Toll Bridges ( Sections 608 & 609).

**Table 6.12**  
**Encasement and Protection Requirements**

Utility facilities must comply with the following encasement and protection requirements:

**1. Types of Encasements and Their Purposes:**

- A. A sleeve is an encasement that:
  - 1) Contains or controls leaks,
  - 2) Facilitates carrier pipe maintenance and replacement,
  - 3) Protects carrier pipe from crushing or bending stresses and minimizes coating damage during installation,
  - 4) Protects the pipe from corrosive elements and aggressive salts,
  - 5) Protects carrier pipe against highway maintenance and repair activities, and
  - 6) Isolates cathodically-protected lines and limits stray currents.
- B. A reinforced concrete jacket is an encasement that:
  - 1) Contains or controls leaks,
  - 2) Protects carrier pipe from crushing or bending stresses and minimizes coating damage during installation,
  - 3) Provides some protection from corrosive elements and aggressive salts, and
  - 4) Protects against highway maintenance and repair activities.
- C. A reinforced concrete cradle protects a carrier pipe from crushing or bending stresses. However, it is not to be used with asbestos cement pipe.
- D. A reinforced concrete slab is placed over an undisturbed facility to distribute and equalize a superimposed load. (Caution: A slab may interfere with other utilities and rock under a load.)

**2. Design Requirements for Encasement or Protection:**

- A. A sleeve is preferred to a reinforced concrete jacket when practical. Considerations include soil conditions, height of embankment, and economic conditions.
- B. A sleeve under the highway must meet "D-Loading, H20-Loading and culvert requirements regarding strength and service life.
- C. A sleeve should have an inside diameter that is 4" larger than the outside diameter of the carrier pipe. A larger clearance may be required under unusual conditions, such as settlement.
- D. Encasements required on freeways and expressways shall extend beyond the access control lines unless Caltrans determines that is impractical.
- E. Encasements required on conventional highways shall extend at least 5' beyond the existing or future catch point. If a catch point is undefined, encasements should extend at least 5' beyond the shoulder lines.
- F. Highway lighting and signal facilities are exempt from these encasement requirements.

**3. Types of Facilities Requiring Encasement or Protection:**

- A. Longitudinal Encroachments:
  - 1) When located on a bridge, by attachment or within a bay.
  - 2) Longitudinal encroachments under the roadbed (existing or future) may require encasement, and will be placed in accordance to Caltrans' Manual on High and Low Risk Underground Facilities Within Highway Rights of Way.
- B. Transverse Crossings: \*
  - 1) All transverse crossings under pressure, multiple ducts, or 6" or greater in diameter shall be encased.
  - 2) Casings for irrigation pipelines shall extend to the right-of-way line or access control line. \*  
Exception to Policy -- Natural Gas Pipelines (see Section 623, and Appendix H)
- C. Sewers:
  - 1) When crossing any State highway. \*
  - 2) When under embankments of 10' or more. \*
  - 3) When detrimental subsidence of the ground under a fill is anticipated. In such cases, a sleeve 6" larger than the outside diameter of the pipe is recommended.
  - 4) Within 5' of the natural ground surface or profile grade.
  - 5) When a new sewer is placed on questionable subgrade. This encasement should be a concrete cradle.

- District Permit Engineer shall determine the type of encasement or protection required as per Section 623.

**Table 6.13**  
**Additional Encasement Considerations**

Consider encasement of carriers that are exempt from encasement, when these possibilities exist:

1. Appreciable settlement of supporting ground.
2. Damage to protective pipe coatings during jacking.
3. A corrosion protective coating and/or cathodic protection may be required due to corrosive environments or when the CPUC requires cathodic protection. (Corrosive environments can deteriorate steel and cement mortar. Check cathodic protection requirements with headquarters Structures Design, Electrical, Mechanical, Water and Waste Water Branch.)
4. Cracking of mortar coating during jacking or boring operations.
5. Corrosion of field-coated joints.
6. Existing electrical and communication lines under an embankment of 10' or more.
7. When any high risk underground facility crosses the roadway.

## **627 UTILITIES/CONSTRUCTION ON SCENIC HIGHWAYS**

### **627.1 Introduction** (Rev 11/04)

The intent of the State Scenic Highway Program is to protect and enhance the natural beauty of California. Scenic highway proposals are initiated by local jurisdictions and officially designated by the Director of the Department of Transportation. Local jurisdictions are required to develop and enforce Corridor Protection Programs for each scenic highway corridor, in the form of ordinances, with the concurrence from Caltrans. Corridor Protection Programs contain land use elements that support scenic preservation along the route. A scenic corridor is defined as the area of land generally adjacent to and visible from the highway. The California Public Utilities Code has regulations pertaining to utilities within the scenic highway corridor.

### **627.2 Utility Facilities** (Rev 11/04)

The California Public Utility Code Section 320 prohibits new overhead utility distribution installations in scenic highway corridors and requires the California Public Utilities Commission (CPUC) to regulate approved work. Section 320 does not apply to transmission towers, conductors or related facilities designed to operate at high-side voltages of 50 kilovolts (kV) or more, unless the utility designates them as distribution lines.

The CPUC also regulates to what extent repair, replacement and maintenance of existing overhead distribution facilities can take place. Caltrans verifies that proposed construction of utility work complies with the Corridor Protection Program and issues encroachment permits for conforming work. The Encroachment Permits Office does not determine when the placement of facilities underground is required. **Determination is made by the CPUC in concert with Section 320.**

District Landscape Architecture and Right of Way Utilities are responsible for reviewing applications for proposed utility work in the right-of-way.

When the proposed work is non-complying, the applicant is notified by the Caltrans' Permit Office to provide the Department with the exception approval from the Energy Division Reliability Section of the CPUC.

Encroachment Permits are issued for work within a scenic highway when existing overhead distribution utilities are in need of repair, replacement, upgrade or increased capacity if there is no significant change in appearance. No significant change in appearance means no increase in the diameter of the distribution line.

California Public Utility Code General Order 320 stipulates that utility owners shall not install new overhead distribution facilities on scenic highways without first obtaining an exemption from the CPUC.

*For purposes of Section 320, the following work does not constitute installation of new overhead distribution facilities and does not require a CPUC exemption:*

1. Removing or replacing sections of worn or deteriorated cable with like-size cable or smaller.
2. Removing or replacing worn or damaged equipment, including but not limited to: transformers, connectors, protective devices or repeaters with like-size or smaller equipment.
3. Replacing a deteriorated pole with like-size or smaller pole.
4. Performing any necessary emergency work to continue service, provided any non-complying facility is corrected when the emergency is over.
5. Installing new or relocated overhead transmission facilities (50 kV or greater).
6. Performing reconductoring or an increase in capacity of existing facilities with no significant change in appearance. This includes replacing the existing conductor with a new conductor of a different capacity or changing the voltage of the line.
7. Temporarily relocating poles for other construction purposes provided such poles are removed or returned to their original position within 3 months of the completion of the construction work.
8. Installing new overhead service connections including necessary transformers and protective devices from existing distribution lines.
9. Installing guys as necessary for existing distribution lines.

*With respect to electric and communications overhead distribution facilities (less than 50 kV) within the scenic highway corridor, utility owners may not perform any of the following work without first obtaining an exemption from the CPUC:*

1. Install new facilities.
2. Relocate existing (distribution) facilities to a new permanent location.
3. Temporarily relocate poles for other construction purposes when such poles will not be returned to their original positions within 3 months of completion of the construction work.

All conditions listed above may be subject to exemption upon written confirmation from the CPUC that proposed work is acceptable.

**627.3 General Construction**

Any work performed along a designated scenic highway should comply with the Corridor Protection Plan established for that scenic corridor by the local agency. The local agency approves any development and decides if the necessary work in the scenic corridor conforms to the Corridor Protection Program. Permit applications for roadways, driveways, drainage, etc., should have appropriate design review and District Landscape Architect concurrence for compliance with Corridor Protection Programs.

When compliance problems are identified, the applicant and local agency are notified. If design aspects meet Caltrans standards and compliance issues are resolved, the District Landscape Architect approves the work and an encroachment permit is issued.

**628 UTILITIES IN AND ON A BRIDGE**  
**Permit Code UB**

A UB Permit Code is used when utilities are placed or maintained within or on a bridge (for exception requirements, see Section 303).

**629 TRENCHING AND SHORING**  
**Permit Code UX**

The UX Permit Code is used whenever trenching and shoring is the construction method for installing utilities (see 516.10).

**Figure 6.1 EXAMPLES OF MECHANICAL PROTECTION**

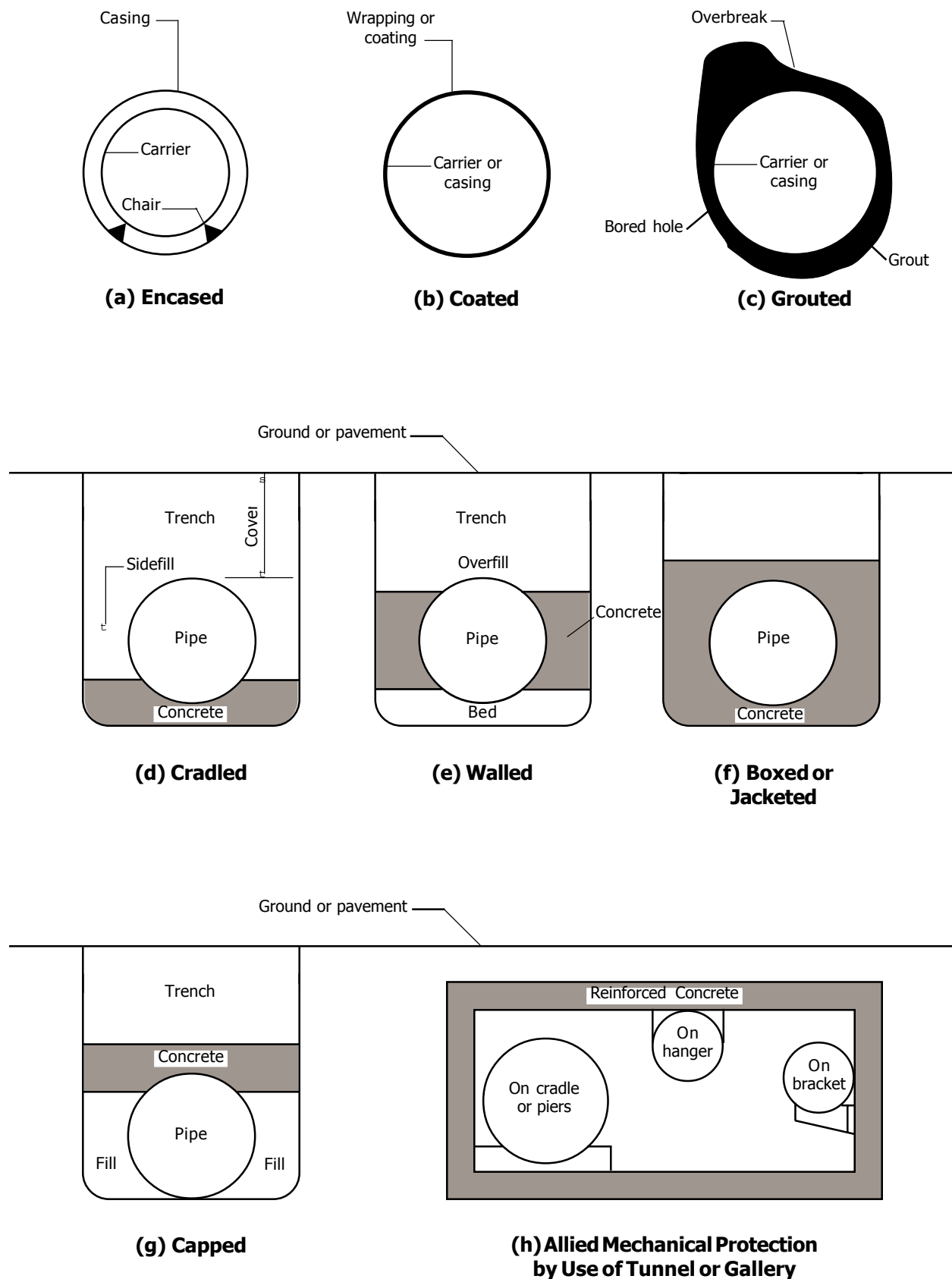
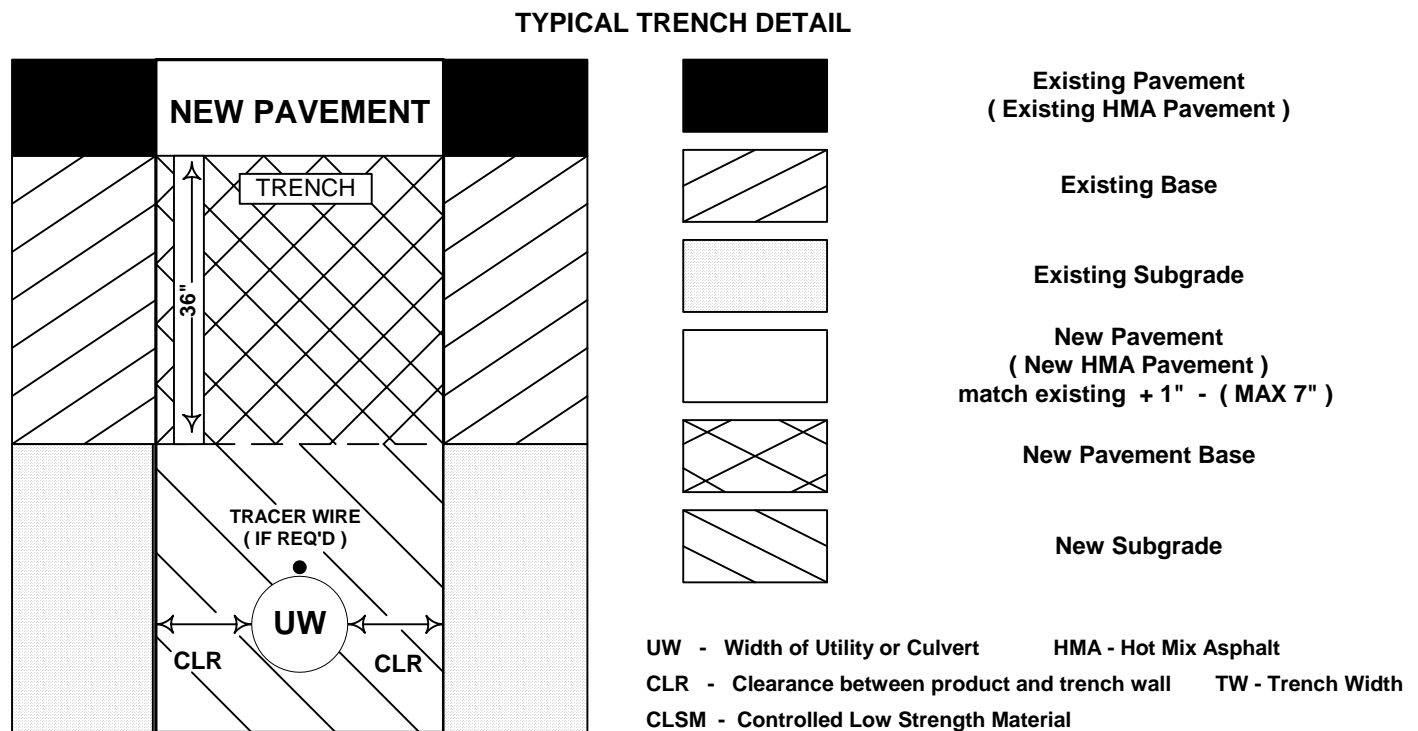


Figure 6.2

## TRENCH DETAILS



STRUCTURE BACKFILL SHALL CONFORM TO SECTION 19 - 3.06 OF THE STANDARD SPECIFICATIONS

SLURRY CEMENT BACKFILL SHALL CONFORM TO SECTION 19 - 3.062 OF THE STANDARD SPECIFICATIONS

HMA SHALL CONFORM TO SECTION 39 OF THE STANDARD SPECIFICATIONS

ALL METHODS OF COMPACTION SHALL BE BY MECHANICAL MEANS. PONDING, JETTING OR FLOODING SHALL NOT BE ALLOWED.

AGGREGATE BASE SHALL CONFORM TO SECTION 26 OF THE STANDARD SPECIFICATIONS

WHEN CLSM IS UTILIZED THE MIX DESIGN AND TEST RESULTS SHALL BE SUBMITTED TO THE STATE'S REPRESENTATIVE.

ALL WORK SHALL BE AS AUTHORIZED BY THE APPROVED ENCROACHMENT PERMIT PLANS, AND/OR AS DIRECTED BY THE STATE'S REPRESENTATIVE.

WHEN THE UW IS  $\geq 6"$  THEN THE MINIMUM CLR SHALL BE 6"

COLD PLANING AND RE-SURFACING OVERLAY SHALL BE PARALLEL TO THE ROADWAY AND TO THE NEAREST LANE LINE FOR THE ENTIRE LENGTH OF THE TRENCH/DISTURBED AREAS, AND/OR AS DIRECTED BY THE STATE'S REPRESENTATIVE.

WHEN COLD PLANING IS REQUIRED, THE MINIMUM SHALL BE 0.10' OR AS DIRECTED BY THE STATE'S REPRESENTATIVE TO ACCOMMODATE FIELD CONDITIONS.

COLD PLANING MAY BE REQUIRED AT THE DIRECTION OF THE STATE'S REPRESENTATIVE TO ACCOMMODATE THE PLACEMENT OF STEEL PLATES.

WHEN TRENCH PLACEMENT IS WITHIN 4' OF CURB & GUTTER, ADDITIONAL COLD PLANING MAY BE REQUIRED AT THE DISCRETION OF THE STATE'S REPRESENTATIVE.

ANY PAVEMENT MARKINGS AND/OR STRIPING REMOVED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AS DIRECTED BY THE STATE'S REPRESENTATIVE.

A TRACER WIRE SHALL BE PLACED ON TOP OF THE FACILITY, WHEN REQUIRED BY THE STATE'S REPRESENTATIVE.

OTHER TRENCH RELATED DETAILS ARE SHOWN IN FIGURE 6.1, CHAPTER 6 OF THE ENCROACHMENT PERMITS MANUAL.

A PAINT BINDER (TACK COAT) OF ASPHALTIC EMULSION CONFORMING TO SECTION 39-4.02, PRIME COAT & PAINT BINDER (TACK COAT) SHALL BE FURNISHED AND APPLIED.

NEW PAVEMENT BASE SHALL CONSIST OF EITHER CL. II AGGREGATE BASE, 2-SACK SLURRY CEMENT, OR CLSM. WHEN TW IS  $< 24"$ , CL. II AGGREGATE BASE IS NOT RECOMMENDED FOR BACKFILL.

NEW SUBGRADE SHALL CONSIST OF EITHER CL. II AGGREGATE BASE, 2-SACK SLURRY CEMENT, OR CLSM. WHEN TW IS  $< 24"$ , CL. II AGGREGATE BASE IS NOT RECOMMENDED FOR BACKFILL.